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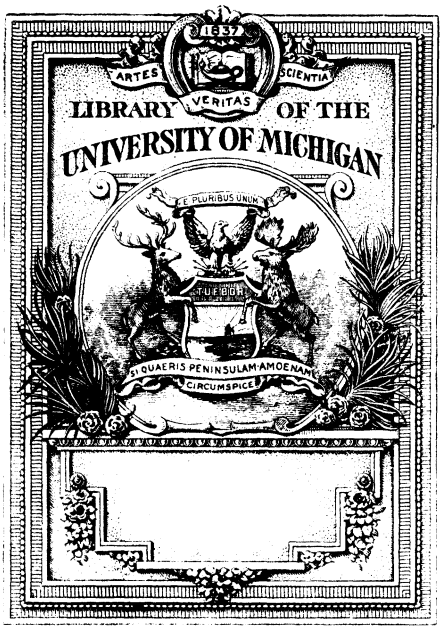

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TRANSPORTATION IN EUROPE

BY

LOGAN G. McPHERSON
LECTURER ON TRANSPORTATION AT JOHNS HOPKINS UNIVERSITY

WITH MAP

NEW YORK
HENRY HOLT AND COMPANY
1910

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PREFACE

In the summer of 1909, shortly after the writer had completed a three-years' study of the freight traffic and freight rates of the United States, opportunity was given him to accompany the National Waterways Commission for an investigation of the conditions affecting transportation and traffic in Europe. His sojourn was prolonged under the auspices of the Commission for six months, during which period he was accorded every facility by diplomatic and consular officers of the United States, by cabinet ministers and officers in charge of the ways of communication on the Continent, and by the Board of Trade, officers of railways and the Royal Canal Commission in England, to obtain the information embodied in this volume. So much travel and research were crowded into a short time that it was not possible, in all cases, to collect material in as full detail as was desired, but the writer believes that the necessary data have been obtained on all important topics. The statistics are from official sources; the accounts of the existing status are based either upon governmental publications, information received directly from those charged

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with the administration of the transportation agencies or from leading men of affairs.

In this volume it is attempted to present the salient facts only, and these in broad outline. Since this study was undertaken the status and procedure of the railways of Germany, Austria-Hungary, Belgium, Italy and France have been set forth in detail in reports published by the English Board of Trade. The reader who desires to pursue the subject is referred to those publications. This book is, in the main, a rearrangement of the formal reports made by the writer to the National Waterways Commission and is published with its consent. That body, however, is in no manner responsible for the contents. As the writer's investigation was concerned only with the economic aspects of the subject, no reference is made to its mechanical and technical phases. Acknowledgment is made of the assistance given by Professor Munroe Smith of Columbia University in a revision of the manuscript that has led to improvement in the expression and accuracy in the allusions to political history.

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Equivalents in the United States of Money, Measures and Weights

		Broadly and generally reckoned
Penny (English)	2 cents	2 cents
Shilling "	24.3 cents	25 cents
Pound Sterling "	$4.86½	$5.00
Mark (German)	23.8 cents	25 cents
Pfennig "	1-100 of a mark	¼ cent
Franc (France and Switzerland)	19.3 cents	20 cents
Lira (Italy)	19.3 cents	20 cents
Centime	1-100 of a franc or lira	⅕ cent

Metre	39.37 inches
Kilometre (1000 metres)	.62 mile
Kilogram	2.2 pounds
Metric ton (1000 kilograms)	2204 pounds

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CHAPTER I

INTRODUCTORY

Europe, as a whole, proper basis for comparison with U. S.

In comparative studies of American and European transportation, the railways of the whole United States are usually compared with those of one or another of the European countries. The area of the United States is 3,025,600 square miles; that of Europe, 3,850,000 square miles. It would seem more fitting, therefore, to attempt a comparison of the traffic status of the entire United States with that of the whole of Europe, to consider from this broader point of view, in each case, the relation between the instrumentalities of transportation and the needs for transportation, and the manner in which the transportation facilities contribute to the material welfare of the people.

In the physical configuration of these two areas there is a vast difference. The western end of what is now generally termed the Eurasian continent juts out into deep water; and passing from Archangel on the north by Christiania, Hamburg, Bremen, Rotterdam, Havre, Antwerp, Liverpool and Hull on the west to Marseilles, Genoa, Naples, Trieste and Fiume on the south, there are innumerable

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ports. To the north of the Alps the land extends in a gradual slope to the North Sea, affording an easy declivity for a number of great rivers. The more broken country to the south of the Alps is not so well supplied with navigable rivers, but hardly any portion is more than 200 miles from the sea. That is, the western end of the Eurasian continent is a peninsula, narrowing towards the west, and nearly every part of it has river communication with and a port upon a deep-water sea connected with the Atlantic. It is, therefore, not absolutely necessary that the import or export traffic of any one of the principal countries shall pass through another country.

The United States is not a peninsula, and vast regions of its interior are without accessible waterways that are navigable to deep water. The long Atlantic coastland extending for the greater part between the Appalachian Range and the ocean, is penetrated by but few rivers that are navigable for considerable distances. The great basin between the Appalachian Range and the Rocky Mountains has the deep water of the Great Lakes to the north and is drained to the south by the Mississippi River and its tributaries. These waterways vary greatly in depth at different seasons; for the main channels are subject to constant change by the erosive currents that carry down and deposit upon their beds enormous quantities of silt. To the west of the Rocky Mountains, the Columbia leads to the Pacific

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in the northern portion and the Sacramento in the central reach of the coastland that extends from British Columbia to Mexico.

Political and economic features

In political and economic conditions the contrast is even more marked. It is the commonplace of the traveler that America differs from Europe because it has had no medieval period. In most of the countries of the Continent the conceptions of the Church and the State are still in a measure those of the Middle Ages; the national jealousies and the spirit of militarism are the outgrowth of that period; the social customs and even the methods of business bear somewhat of its impress.

At the beginning of the Christian era the barbarian tribes of Northern Europe were without permanent local habitations. Their food was the flesh and their clothing the skins of animals; and in their earliest tillage new ground was broken yearly. When, in the fifth century, these barbarians swept over Southern Europe, the ancient civilization, already decadent, was replaced by simpler forms of economic life. The more intensive agriculture and the handicrafts which continued to exist in the south, and which spread northward, had to be protected from despoilers; and as no efficient state organizations were developed by the invaders, each locality was thrown upon its own resources. The open towns of the Roman world had been walled in to meet the first barbarian inroads, and the towns that gradually grew up in the north were of the

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same ancient type. Here and in the open country feudal castles appeared, each a fortress, usually located to guard a mountain-pass or the ford of a stream or at some other place of strategic importance. Around each clustered the dependents, the farmers who supplied it with food, the artisans who wrought the cloth and fashioned the implements. Similar settlements arose near the monasteries and other establishments of the Church, with similar dependents beneath the shadows of their walls. Until the later centuries of the Middle Ages, even the more important cities were usually under the control of a secular or a spiritual magnate, a count or a bishop.

Present-day effects of Feudalism

As handicraft developed, it was by the work of the artisans in these towns and settlements. Their products were used almost entirely within the community, there being little traffic among these small political entities. Throughout the centuries of conflict, as small feudal areas were absorbed into a duchy or a principality, such progress as there was in handicraft continued to be that of the local artisan, whose raw material did not come from far and whose products did not find a distant sale. The small populations readily obtained their food from fields and forests at hand. On hand-looms were woven the cloth that local tailors fashioned into garments; the farmers killed the cattle and tanned the skins that local cobblers made into shoes and local curriers into harness and trappings. Even

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the metals were smelted and wrought by local smiths and armorers. Stone for the buildings came from neighboring quarries. The rude furniture was made by local carpenters. Thus developed the régime of local industry and of house trades, and that self-sufficiency of the community which characterized even the capitals. With the increase of the peoples leading a settled life, a wider exchange of products was obtained through the fairs held once or twice a year, to which the houseworkers and the local artisans took their surplus wares, but even this more extended distribution was over a limited area. The earlier traffic handled by the medieval merchants was mainly composed of luxuries from the Mediterranean and the Orient, which did not move in great volume and were used only by the wealthy and the powerful. This traffic yielded profits not infrequently of from 200 to 300 per cent, and sometimes of 1500 per cent, but it was also subject to great losses from marauding highwaymen. The traffic of these merchants so extended that staple articles were included, but none even of these could be carried for considerable distances in large volume. Indeed, prior to the nineteenth century, traffic was in small quantities only, not conducing to the benefit of the masses of the people.

Self-sufficiency of the community

The self-sufficiency of the community continued in the countries of continental Europe, with relatively little change, until within the last half-

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century; and in the smaller towns of the interior and in the open country this industrial status obtains to-day to a degree almost incomprehensible to a man who has lived his life in the United States. Women still work in the fields and carry great burdens on their heads; peasants wear wooden shoes and drive carts with oxen. In Brussels dog-carts deliver milk; in Naples goats are driven through the streets and up the stairways to be milked at the customer's door; in the markets of Paris are still the red-coated *sans-culottes,* bending under the stacks of vegetables carried in wicker-work baskets on their backs. In the smaller towns are little shops with crude and scant stocks. Although the parcels post is much used, the great department stores that bring the wares of the world to the hand of the workingman have gained a foothold but here and there.

Division of labor in U. S.

This is all in marked contrast with the industrial and commercial status of the United States, where the division of labor which accompanies advancing civilization is carried to an extended degree. While in Europe the medieval practices were being cemented into custom, the American settlers were winning this land from the Indians. Then they obtained political independence, and shortly afterward they were face to face with the age of steam. At this time, but a hundred years ago, the countries of the European continent were worn and impoverished by war. The United States was at peace;

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her people, filled with energy and abounding in enterprise, unoppressed by government, unfettered by the Church, and but little burdened by tradition, were ready to seize upon, adapt to their needs and develop any instrumentality that would increase the productivity of vast and virgin resources. For a time the self-sufficient community existed in this country; but it was based on economic necessity, not on feudal organization; the settlers were not in the shadow of either castle or monastery. This self-sufficiency has entirely passed away. In the United States of to-day, it is not characteristic of a single community, no matter how small or how remote. Here, within the 50 years following the introduction of steam-power, inventions were multiplied; the products of the machines driven by stationary engines in the East were taken by locomotive engines to the Mississippi. Here industry has progressively tended to localization at the places best fitted for production. Food, clothing, tools and utensils, articles of use of whatever kind, flow from these places of production throughout the entire country.

Slower development in Europe

In continental Europe 50 years after the introduction of steam as power, the use of machinery driven by steam was but at its beginning. The sale of shoes made in large quantities by machinery has begun only in the past 20 years or so; in many places it is still cheaper to have a suit of clothes made by a local tailor than to buy a suit ready made; only

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the finer grades of furniture are carried from one country to another; the flow of foodstuffs across national boundaries has attained fairly considerable proportions only in recent times; the use of improved machinery in agriculture has received a pronounced stimulus only of late, and by the efforts of American manufacturers. On the continent of Europe there are no such flour mills as those of Minneapolis; but few iron and steel factories approaching those of Pittsburg, Buffalo, Cleveland or Chicago; no such textile factories as those of New England or the Carolinas; no such shoe factories as those in Massachusetts and St. Louis; no centers of furniture manufacture such as Grand Rapids and Chicago. Alone of the great capitals of Europe, London and Berlin draw supplies of butter, eggs and poultry from great distances. The fruits and vegetables of Italy and France are finding wider markets; but nowhere in Europe is there that widespread distribution of produce, reaching down into the smaller towns, that has become conspicuous in the United States.

Comparative progress

It might be unfair to say that what has been done in the United States in 100 years has not been done in Europe in the 1400 years since the fall of the Roman Empire. But if a comparison were made of the material progress since the introduction of steam, it would probably be found that in this respect the great cities and towns of the European continent, with perhaps a few ex-

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ceptions, are about where cities and towns of equal importance in the United States were 40 years ago. Yet the comparison would not be favorable to the United States at all points. In many lines of manufacture, requiring long training and great skill and patience on the part of the workmen, Europe produces wares far superior in fineness and delicacy to those of America; and the administration of the great cities of Germany secures a cleanliness and orderliness that puts to shame any of the great industrial and commercial centers of this country.

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CHAPTER II

LAND ROADS AND INTERIOR WATERWAYS

In that feudal era when castle and church were the nuclei of the scant and scattered settlements, communication overland was beset with many difficulties. The old Roman post roads had been fairly well maintained, but they were far apart. Travel and conveyance meant the crossing of bog and fen and forest.

Waterways provided by nature

Of all the means used by man for travel or for the conveyance of things from one place to another, waterways and watercraft have held the largest place in history and literature: all that pertains to them still appeals to the imagination and to a sympathy deepened by centuries of familiarity. Sea and river were the gift of nature; land roads the laborious creation of man. The commercial supremacy of one nation after another was attained by merchant vessels and maintained by sea power. Sloops and triremes that navigated the seas also penetrated the rivers. The great rivers of Central Europe, flowing over long distances with gentle and gradual declivity in channels with banks and beds of rock and gravel, became the principal means of communication. At the mouths of the rivers arose

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the ports through which traffic was carried to and from other lands in sailing ships that came and went at long intervals, but whose voyages increased as mariners learned to round the southern capes, and even more with the discovery of the New World. Money and effort were expended upon the improvement of the rivers; there was begun that work which has led to the revetting of the banks to prevent overflows and make the channels more permanent and to the making of cuts through tortuous bends. To protect the lands of the Netherlands, dykes were built and then ditches to drain the supersaturated soil. Holland and Belgium were covered with a network of canals; canals were built in other continental countries to connect one river with another, in places to facilitate access to a port. With the launching of larger ocean vessels harbors and ports were improved, and there was an increasing differentiation between deep-sea craft and inland-water craft. Wares brought from foreign lands to the ports by sailing vessels were transhipped to the interior by smaller sailing vessels or rowboats on the rivers, and by boats drawn by hand or by animal power along the canals. In the early part of the nineteenth century the rivers and the canals were the accepted routes of interior transportation. Land roads had been improved and extended, but conveyance by water was preferable, propulsion over its yielding surface demanding less of energy.

Canals

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Development of European ports

The import and export traffic of the great countries of modern Europe is centered in the ports. Great portions of the traffic going and coming through the ports are carried to and from the interior by the rivers and in lesser measure by the canals. Because of the intense jealousy between the nations it has not been their policy to promote in the broadest sense traffic between themselves. The commodities which each nation was especially adapted to produce in excess of its own requirements found market in other lands, such commerce obtaining especial stimulus from the founding and the maintaining of colonies in other parts of the world.

It may be of interest to trace in the respective countries of continental Europe the landway and interior waterway development.

Landways in France

It was in France that great attention was first given to the construction of landways, and the great highroads of this country have been the admiration of travelers for more than two hundred years. The organization of the principal thoroughfares, of which the old Roman roads were the basis, was begun by Sully in the first half of the seventeenth century, furthered by Colbert and continued by the Engineers of Roads and Bridges during the reign of Louis XV. Funds from the royal treasury were liberally devoted to their maintenance, which was also secured by the compulsory coöperation of the people. Napoleon reorganized the service, charg-

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ing upon the several departments all the expenses incurred for roads of secondary importance; and the work has been continued under the various succeeding governments. The total expenditure for the establishment of the highways, rural roads and streets, since 1820, has been about $850,000,000, and the cost of maintenance, of which part—for other than the highways—is paid by the localities, is $50,000,000 per annum. Over the present network of about 381,000 kilometers, or 236,741 miles, of national highways passes an annual traffic of 1,530,000,000 ton-kilometers, which is only about 6500 ton-kilometers per kilometer. The traffic of the smaller roads, 400,000 kilometers, or about 250,000 miles, in length, is unknown.

The rivers of France

The rivers of France are not as easily navigable as are those of northern and eastern Europe. The difference in current is indicated by the fact that a height of 100 meters, or 328 feet, above the level of the river mouth is attained by the Rhone at a distance of but 215 kilometers, or 133 miles; by the Seine at 556 kilometers, or 345 miles; by the Rhine at 621 kilometers, or 385 miles; by the Elbe at 662 kilometers, or 411 miles; by the Volga at 2000 kilometers, or 1242 miles. From the medieval period, the rivers of France have been used for navigation. The traffic at first paid taxes to the feudal lords, who gave themselves no concern about the improvement of the waterways, but bargemen finally grouped themselves into corporations which

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purchased from the king exemption from these exactions. In the seventeenth century began under private enterprise the building of canals, whose cost it was endeavored to regain by charges on navigation. These tolls were suppressed by the Revolution and the canals were confiscated by the government, but the tolls were again established by Napoleon.

The French government and waterways

Under the Restoration, in 1821 and 1822, the government prepared a program of waterways for the construction of which it devised a system of loans, the investors to have as security the tolls to be exacted on the new waterways. The impulse thus given was furthered by the creation in 1857 of an extraordinary fund for the direct construction of waterways by the national government, the expenditure for the new works from 1823 to 1847 averaging nearly $4,000,000 per year. From 1847 to 1860 this annual expenditure was reduced to $1,600,000, the government, sustained by public opinion, being almost exclusively occupied with the extension of railways.

An impetus toward the further extension and improvement of the waterways originated in 1860 and found its culmination in the marvelous return of prosperity that followed the Franco-Prussian War. In 1879, under the program prepared by de Freycinet, it was decided to enlarge existing canals, to construct about 2000 kilometers of new canals and to repurchase such canals as were held under

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concessions. Expenditures rapidly increased from year to year until, in 1883, they had reached about $14,400,000. Then came the financial crash, which rendered impossible further continuous borrowing by the government and led to more thorough calculations, showing that the hasty estimates made at the inception of the great program would have to be at least doubled. The construction of many of the proposed lines was abandoned, but not until 1888 could the expenses be so reduced as to be included in the governmental budget without borrowing. Their annual total during the nine years of the extraordinary budget averaged over $10,000,000. During the succeeding nine years, ending with 1907, this average annual expenditure was brought down to a little over $3,000,000. In 1903, however, although the program of 1879 had not been carried to completion, a new program was sanctioned involving an expenditure of about $40,000,000.

The grand total of governmental expenditure for the construction, improvement and repurchase of waterways from 1821 to 1906 is about $320,000,000, of which about half has been expended since 1879. Upon the network of the north and east lines, which carry about half of the total interior navigation, has been expended $16,000,000, an average of over $64,000 per mile. Upon a network comprising the navigable parts of the Saone and its branch-lines, upon which the traffic is but a third of that on the

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north and east lines, has been expended $24,000,000. One of the least expensive canals has cost over $74,000 per mile; another about $235,000 per mile; and another, estimated at first at $8,800,000, has cost $17,200,000, or about $200,000 per mile. These are expenditures for the construction of canals; they include locks, tunnels and other correlated structures. The improvement of rivers has not cost so much, but still a very mediocre way upon part of the Rhone has cost over $74,000 per mile.

These expenditures upon interior waterways have been defrayed almost entirely by the national government, which is also under an annual charge of between $3,500,000 and $4,000,000 for their maintenance.

In 1880 the government abolished the tolls which formerly contributed to an appreciable extent towards meeting its expenditures upon the waterways. As an offset to these expenditures the government has now only the dominical revenues, those obtained for fishing purposes, from plantations, for water taken from the rivers, and from the tax on passenger boats, which all told do not equal $650,000 a year, or not more than one-sixth of the annual expenditure for maintenance, leaving the expenditure for construction and improvement entirely without offset.

In exceptional cases only does the proprietor of the merchandise transported own the craft. The industry is still that of the small enterprise. Of

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the boats, other than steamboats, two-fifths both as to number and tonnage belong to boatmen, each of whom has only one boat and sails that boat himself. This proportion, however, has fallen: 10 years ago it was one-half. Another fifth belongs to boatmen, each of whom owns two or three boats and almost always sails one of them himself. Really important enterprises, each possessing 20 boats or more, scarcely represent more than one-tenth of the total tonnage. The boatmen live on their boats with their families. Thirteen thousand three hundred boats are provided with cabins which were shown by the last census to be inhabited by 18,600 men, 10,800 women and 16,200 children, this floating population having no other home. Nearly 3,000 of the boats are provided with stables sheltering their draught animals, 2400 horses, 150 mules and 1950 donkeys.

The traffic on the rivers and canals is under free competition, the carriers charging for their service what they please, or rather what they are obliged to charge under the competitive conditions. In many places, however, the charges are maintained at a fairly uniform level.

Waterway rates in France

It is very difficult to ascertain the average charge made by the river and canal craft for transportation. A very small fraction giving regular service appears to obtain four to six or even eight centimes per ton-kilometer. On the canals of the center and south of France, where the traffic is scant and where the navigation conditions are not good, the charge

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per ton-kilometer is usually two and one-half centimes. On the canals of the north and east the great improvement during the last 30 years in the location of the waterways and the organization of haulage has brought about a great reduction in the charges, which now vary perhaps between one centime and one and one-half centimes per ton-kilometer.

As one centime per metric ton-kilometer is equivalent to 292 one-thousandths of a cent per ton of 2000 pounds per English mile, it will be perceived that two centimes per metric ton-kilometer is equal to .584 cents per net ton-mile, a rate higher than that paid by much of the coal carried by rail in the United States, while two and one-half centimes per metric ton-kilometer is .73 cents per net ton-mile, which is about the average rate received by the railroads of the United States on all their traffic.

Waterways, a financial burden

It is estimated that the total traffic on the rivers and canals of France exceeds 5,000,000,000 ton-kilometers, from which the boatmen derive a revenue of from $12,000,000 to $16,000,000 annually. The government receives none of this; but if, for the sake of comparison, we assume that the government, operating the entire interior navigation, received the highest estimated revenue of $16,000,000, less the $3,500,000 which it is now paying for the maintenance of these waterways, there would be left but $12,500,000. Interest at four per cent on $320,000,000, expended by the government upon the

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construction and improvement of these waterways, would amount to $12,800,000 a year. The assumed revenue of $12,500,000, moreover, leaves out of question the investment in the craft, the expenditure necessary for their maintenance and operation and for the support of the boatmen and their families. As the matter actually stands, the government has made a capital investment of $320,000,000 from which it not only derives no interest, but on which it pays an annual maintenance of over one per cent. As a result of this governmental investment and maintenance, a bare livelihood is obtained by the boatmen and their families, and their entire revenue is less than the maintenance, and the interest on the capital invested calculated at four per cent.

French waterway more expensive than U. S. rail transportation

As 5,000,000,000 ton-kilometers are equal to a little over 3,425,000,000 ton-miles, and as the charge borne by the government appears to be $15,650,000—*i.e.* $3,500,000 maintenance, plus $12,800,000 interest, less $650,000 revenue—it will be perceived that the cost of interior water transportation which falls on the French government is over 4½ mills per ton-mile. If the watercraft receive an average of but a centime and a half per ton-kilometer the waterway traffic of France bears a charge of nearly nine-tenths of a cent per net ton per English mile, which considerably exceeds the average received by the railroads of the United States on all their traffic.

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Length of navigable waterways of France

The interior waterways of France classed as navigable have a length of 16,730 kilometers, or 10,372 miles. The length really available for navigation is but 11,900 kilometers, or 7378 miles; and on routes aggregating only 6000 kilometers, or about one-half of the really navigable routes, is carried nearly 96 per cent of the interior waterway traffic. The waterways with this great density of traffic are the Seine between Havre and Paris; those portions of the Seine and the canals connected therewith which directly serve Paris with the coal, cement, stone, brick, and a portion of the grain and wine consumed by that city; the north canal which carries coal to and from Belgium; and the canals which carry coal to and from Germany. The other interior waterways of France—the remaining half of those that are really available for navigation—which carry only about five per cent of the traffic, are used for the transport of coal for general consumption, of wood, cement, brick and, in some cases, of wine in large packages.

German waterways

To the north the German Empire fronts on the North Sea, into which, flowing through Germany from sources far in the interior, pour the Elbe and the Weser; and on the Baltic Sea, to which are tributary the Oder and the Vistula, a broad but little used stream. The Rhine, which moves a greater traffic than any other river in Europe, flows for the most part through Germany but finds its outlet through Holland into the North Sea. It was but

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natural that these rivers early became of commercial use; and that the cities of the alliances, of which the Hanseatic League is a type, were on the waterways which provided channels of communication subject to comparatively slight interruptions from physical obstacles. Conspicuous trading centers not located on waterways were the cities of Augsburg and Nuremberg, which focused the landways from the Mediterranean and made tributary a large portion of what is now inland Germany. These landways were principally the old Roman roads, which were maintained during the period of the Holy Roman Empire chiefly for the conveyance of passengers and the post.

Early history of German waterways

The petty states which are now united in the German Empire lived in a condition of mutual antagonism which often found expression in armed conflict and was always marked by the exaction of frontier duties. This condition affected transportation by water as well as by land. Even in the latter part of the eighteenth century every boat that sailed the Elbe from Hamburg to Magdeburg paid toll 14 times; and along the short reach of the Main from Hamburg to Mayence were 33 toll stations. Even more hindering than the demand for toll was the loss of time, since vessels were often tied up for hours at a time at these little stations. Cologne even demanded that all passing traffic be unloaded on its wharves and loaded again, that the city might obtain the fullest tribute. The imposts

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placed upon the river traffic by the petty states and municipalities became so burdensome that by mutual concessions they were first diminished and finally abolished. In the early part of the nineteenth century tolls on vessels navigating the Rhine were forbidden by international conventions; and in becoming free from these exactions the Rhine became the first great commercial thoroughfare not only of Germany, but of Europe.

There is definite record of the building of locks in Germany in the middle of the fifteenth century. In the middle of the eighteenth century a few canals were constructed in Prussia; but these were small and insignificant, being designed to compete with the landroads only in short-distance traffic. The existing canals serve mainly as connecting waterways between lakes and estuaries. An exception is the Dortmund-Ems Canal, built to connect the Rhine with Emden, a German seaport; and another exception will be furnished by the canal projected from the western to the eastern part of Prussia, whose extension beyond Hannover has been prevented by the antagonism of the agrarian landlords of the east, who fear that it will facilitate the bringing of imported grain to their markets. Of the total length of inland waterways, specified in the government reports as 8750 miles, 5041 miles are main streams, 885 miles canalized rivers, 1369 miles navigable canals, and 1443 miles canals connecting natural waterways. Of these, however, only about

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6200 miles are available for navigation. This mileage of really available waterways is the same to-day as it was 40 years ago, the construction of new canals during this period being offset by the abandonment of old canals, either because the railways have outdistanced them, or because their traffic has so dwindled that their maintenance has not been worth while.

Prussian expenditures on waterways

The total capital expenditure of Prussia on its rivers, canalized rivers and canals to 1905 amounts to $132,500,000. The expenditure in improving its rivers has averaged over $30,000 per mile; on the Rhine, over $60,000 per mile. The expenditure on the canalized rivers and canals has averaged over $40,000 per mile. The total expenditure of Prussia on the maintenance of its interior waterways in 1905 was over $4,000,000; its total receipts in that year from these interior waterways, that is, the rivers, and canalized rivers and canals, was about $1,700,000. That is, the revenue from the interior waterways in 1905 was over $2,300,000 less than the expense for maintenance. If thereto be added interest charge on the capital at four per cent, amounting to $5,300,000, it is found that the charge borne without offset by the State of Prussia during 1905 for its interior waterways amounted to over $7,500,000.

The principal coal fields and some of the most important ore beds, are in or near the valley of the Rhine. These conditions have naturally led to the

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Rhine industries

establishment and development of great iron and steel plants along the Rhine and in its vicinity. As necessity has arisen for the importation of ore from Spain and Sweden, this naturally follows the water-course up the Rhine and the products for export naturally go down the Rhine to the seaports. As other manufactures have developed, the abundance of coal and the developed means of water transportation have attracted them also to the valley of the Rhine. This tendency has continued until, at this time, considerably more than 60 per cent of the manufactures of the Empire are produced in this region. This industrial development has given to the neighborhood of the Rhine a vastly greater density of population than is found in the interior and has caused a great appreciation in land values. For the trade of this valley with other parts of Northern Europe, the Rhine furnishes an especially convenient waterway, because it is practically an estuary of the North Sea, small steamboats running direct from Cologne to England as well as between Cologne and Hamburg and other ports of the North and Baltic Seas. This peculiar combination of advantages accounts for the fact that the traffic carried on the Rhine is 43 per cent of the entire inland water traffic. Perhaps one-half of this Rhine traffic is of imports and exports and one-half is local. That which is local consists principally of the heavy and less valuable commodities—coal, stone, cement and wood. It is as though the State

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of New York were an independent nation, with other independent nations on its borders; the Hudson River navigated by lines of steamboats plying between Albany and Philadelphia, Boston and other Atlantic ports; railroad communication between New York and the neighboring States in no advanced stage of development; and extensive coal fields and beds of ore in active exploitation in the vicinity of Newburgh and Poughkeepsie. Under such conditions these towns would become great centers of iron and steel and other manufactures, and the Hudson would be freighted with barges carrying coal to West Point, Albany, Troy and the city of New York. The economic advantages offered by the other river valleys of Germany are not so marked, and on no other German river, accordingly, is the traffic nearly so great as on the Rhine. Yet the Elbe carries 24 per cent—so that the Elbe and the Rhine together carry 67 per cent—of the entire inland water traffic.

Waterway rates in Germany

The rates charged for transportation on the waterways are subject to no sort of governmental regulation. The watercraft pay small tolls for the use of the canals, but they pay nothing for the use of the rivers. Their charges are determined by competitive commercial conditions; that is, they are as low as is necessary to secure traffic in competition with each other. On one or two of the rivers to the east, where the volume of water traffic is not large, the boat-owners have been able to reach agree-

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ments for the maintenance of rates; but these are never held at a point that yields very much profit. On the Rhine, where a multitude of owners ply boats of one kind and another, it does not seem that such agreements can be made effective for any extended periods. Here the competition between the watercraft frequently reduces the carrying charge to the basis of bare existence, to what the Germans designate as "self-costs."

Proposed extension of German waterways

It is held that certain traffic, that now moves by river to the North or the Baltic Sea and is then transhipped by sea to the mouth of another river and thence again transhipped inland, would go by a more direct water route across the Empire if the waterways were more thoroughly extended. Plans have been prepared for a network of canals to further such direct shipment and to facilitate distribution between the places of production and the places of consumption. The carrying out of these plans has been deferred because of the contention that further large expenditure should not be made on the artificial waterways until the natural waterways are made productive of revenue to the government; that is, until tolls are charged on the rivers as well as on the canals. To this end an amendment to the Imperial Constitution will be necessary. This will mean a radical change of policy, as it has heretofore been traditional in Germany, as in other lands, to improve the bays, harbors and rivers—that is, the natural waterways—and to maintain them as

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national highways free of toll from watercraft. The proposed vast expenditure for the construction of artificial waterways has also raised the question, over which there has been much controversy, as to whether the nation is justified in expending revenue that comes from the taxpayers as a whole for a purpose that is of particular benefit to a limited region only, that is, to the particular district immediately served by a canal. The tremendous advance of the valley of the Rhine and the far less developed condition of the interior give especial point to this contention.

The Netherlands

Prosperity was first attained by the Netherlands because the great cities of Amsterdam and Rotterdam are at the mouths of the Amstel and the Rhine, over which commerce is conducted with the interior provinces and with Belgium and Germany. It was this traffic that gave Amsterdam medieval prominence as a port of reception and distribution for the wares of other countries, and in this respect it still holds a leading position, its activity as a mart for the products of the Dutch colonists of the East Indies largely accounting for the fact that this city is a great financial center.

Large portions of the Netherlands lie below the level of the sea, from which they are protected by dunes formed by the wind and by dykes, the erection of which began hundreds of years ago. The saturation of the land led to the digging of ditches for draining the soil. It was an easy matter to pro-

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pel a small boat along one of these ditches; the development into a small and then into a larger canal was easy and natural. Thus have grown the canals of the Netherlands, which now cover a length of 2408 miles. Of this total the national government has constructed and maintains 342 miles; the provincial governments, 493 miles; the local governments, 805 miles; various combinations of national, provincial and local governments, 148 miles; private companies, 372 miles; combinations of private companies and one or another governmental organization, 248 miles. Nearly every town and almost every farm in the country is touched by one of these canals, which are naturally the generally accepted means of communication for freight of all kinds. Under governmental control are also 23 waterways, with a length of 554 miles, formed by the principal rivers.

Since 1900 no dues or tolls have been charged by the national government for the use of the rivers and canals under its supervision. On the canals owned by private companies certain tolls are charged, but these must be approved by the government and are only nominal. In some few cases tolls are levied by the separate provinces; but these also are nominal. The entire extent of the inland waterways upon which tolls of any kind are levied is but a small percentage of the total.

The charges made by the watercraft for transportation on the rivers and canals are not regulated

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by government and there is no combination among the proprietors of the craft for the maintenance of rates, the boatmen charging what they can get. In a large number of cases the boatman owns his boat and lives upon it with his family; but there are two companies which own about 700 craft each. About 150 separate lines of small steamers give regular service between the numerous towns. Ferry lines and lighters are owned by the railroads, and many of the manufacturing companies own and operate craft engaged especially in their service.

There is a special Ministry of Waterways (*Waterstaat*), but its statistics are very incomplete. It is not possible to arrive at the total capital expenditure upon the Dutch inland waterways because this expenditure has been made throughout long periods of time, and not only by the national government but also by provinces and communities. Adequate records of the totals have not been kept, nor, if they had been, would it be possible to allocate them between the purposes of drainage and navigation. The annual expenditure of the national government upon the maintenance of the inland waterways has been decreasing during the past 10 years, ranging from about $3,000,000 to about $2,000,000 per annum. The totals of the maintenance expenditures of the provincial and local governments and of the private companies could not be procured.

Belgium

In Belgium, which was politically connected with the Dutch Netherlands in the Middle Ages and was

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united with them in a single kingdom from 1814 to 1830, the conditions are somewhat similar. At the mouth of the Scheldt is the great port of Antwerp. The Meuse flows from France through eastern Belgium by the city of Liège, thence through Holland by Rotterdam to the sea; and its tributary, the Sambre, is also navigable for a considerable part of its course. These rivers, however, supply the transportation needs of Belgium to but a small extent, neither of them being available very far inland for deep-sea transportation; and they offer no special advantages to attract industries to their banks. Here, as in Holland, canals were first built for drainage, and then extended for navigation, the country being now well covered by a network of these artificial waterways. Most of them focus upon the port of Antwerp, through which pass nearly all the food supplies received by the kingdom and the manufactured products exported from it. There is, however, between Ostend, on the North Sea, Bruges and Ghent, a canal which carries a small portion of the import and export traffic. Steamers of small capacity ply between Brussels and London, and tramp vessels of considerable capacity sometimes come to Brussels.

In 1830, at the time of the contest with the Netherlands that resulted in the attainment of national independence by Belgium, there were in this state 1618 kilometers of inland waterways, 10 per cent of which belonged to the government, 64 per

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cent to provinces, seven per cent to communes and 19 per cent to private concessionaries. In 1909 there were 2077 kilometers, or 1290 miles, an increase of little more than 400 kilometers, or 250 miles, in three-quarters of a century. Their course is about the same to-day as it was thirty years ago, the new canals having been constructed in most cases to make connection between the older waterways. Since 1870, 83 per cent of these interior waterways have belonged to the state, seven and one-half per cent to the provinces, four and a half per cent to communes, and but five per cent to concessionaries. From the first tolls have been charged for their use; but these have been reduced and standardized at various times and are now very small. Boats charge what they please for transportation, the boat-owners, or brokers in their behalf, bidding for traffic on the floor of the Antwerp Exchange. In nearly every case the boat is navigated by the owner and his family, who live upon it. The boatmen make somewhat more money than the ordinary workingmen, but never a very high profit. These men are helped by an association, which is permitted by law to loan money on mortgages on a boat after it has been built. Because of a certain movement of traffic on the inland waterways between France, Holland and Belgium, there is an agreement as to the size of the boats, in order that those of either country may go through the canals of the others.

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In 1904 there were registered in Belgium, 9370 boats; in 1908, 10,779; with capacity ranging from 70 to 500 tons. Although of recent years the waterways have not been extended, they have been well maintained and improved, large sums being annually expended by the government for this purpose. The capital expenditure has been from $55,000 to over $450,000 a mile, the total to 1905 being $79,050,000. The average annual charge for current improvements and maintenance is $445,000. The receipts for 1905 were $400,000. If to the deficit in meeting the current expenditures for that year be added interest on the capital at four per cent or $3,162,000, it appears that the total charge borne without offset by the Kingdom of Belgium on account of its waterways for the year 1905, amounted to over $3,200,000. In this year the total ton-miles were 708,361,000. Of this total, 27.7 per cent represented the transportation of coal and coke; 18 per cent, building materials; 17.5 per cent, agricultural produce; and 12 per cent, industrial products, including pottery and glass. In the southwest the traffic of the waterways arises principally from the French and Belgian coal fields; in the northeast, from the large cities and industrial districts; and much traffic moves on the waterways connecting Antwerp with the Rhine.

Russian highways and rivers

The retarded development of the roads of Russia is exemplified by the fact that the miring of Napoleon's army in the swamps was a prime reason

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for the lack of success attending the march on Moscow. The first governmental highway was completed between St. Petersburg and Moscow in 1834. The national highways were gradually extended until at present they cover about 10,000 miles. Although the national government bears the entire expense of maintenance, amounting to about $3,650,000 annually, two-thirds of these roads are under the direction of district officers and the other third under the direction of local communities.

The rivers of Russia are among the largest in the world, the length of the Volga being 2220, that of the Ural 1500, and that of the Dnieper 1340 miles. The first attempt at canal construction was made at the instance of Peter the Great, who wished to connect the Don and the Volga; but the work was brought to a sudden stop in 1701 by the war with Sweden and was never resumed. An attempt to connect the Don and the Oka was similarly brought to an end by war with Turkey. The first completed canal connected the Volga with Ladoga Lake; it was under construction from 1704 to 1706. This was the first line in the network of waterways which provide communication between the Caspian and the Baltic Seas; the other lines were built at various times during the next 100 years. Before their construction vessels were dragged overland from one river to another. During the first half of the nineteenth century, a half-dozen small canals

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were built to connect the Dnieper and the Moscow with the Volga. During the last quarter of the century many of the older canals were enlarged; many of them, however, have fallen into disuse. The only river upon the improvement of which considerable expenditure has been made is the Moscow. For the last fifty years there have been projects for connecting the Black and the Baltic Seas; the Baltic Sea and the Arctic Ocean; the Caspian, the Azov and the Black Seas; and these projects are still being discussed without practical result.

The total extent of natural and artificial waterways in European Russia is 37,000 miles, of which about 22,000 miles are navigable, the remaining 15,000 miles being available for rafting. Of the navigable stretches steamboats traverse a little over 13,000 miles. The work of the government has been devoted chiefly to connecting the rivers that flow into the various seas. The length of these connecting canals is only about one-fiftieth of the length of the rivers and the tributaries thus connected. Before the days of steamboats, the hauling was largely by hand, as many as 600,000 men engaging in this labor in the intervals of agricultural employment. The loading and unloading of all traffic is even now done exclusively by workmen and in a most primitive manner, without any mechanical appliances except crude windlasses.

All of the canals, with one or two inconsiderable exceptions, have been built by the government; and

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those which it did not build it subsequently bought. During the last 100 years the capital expenditure on the interior waterways has approximated $500,000,000. The average annual appropriation for improvements during the past 10 years has been $850,000. The annual expenditure for maintenance and operation is about $6,000,000. No tolls are charged except on the Ladoga canal, the Dniester River and the improved Moscow waterway. The total return to the government from these tolls is $90,000 per annum, of which $75,000 is included in the general revenue of the state.

Of the craft now used on the inland waterways 3295 are steamboats and 23,175 barges. A half-dozen companies own from 10 to 55 steamers each, and 626 merchant vessels are owned and operated by local communities. Barges as a rule are still owned by small proprietors, who generally possess one or two, rarely as many as five. In 1907 these waterways carried 39,663,000 tons of freight. The traffic is very largely of rafts of logs and lumber, these forming from 95 to 100 per cent of the entire traffic of many of the rivers. For such craft as carry mail and run on a regular schedule, the government fixes maximum rates of freight, below which these craft can charge what they please. Rates on other watercraft are made at the will of their owners and are subject to wide fluctuation. There are, however, regular classifications of freight.

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Austria-Hungary

In Austria-Hungary, as in Russia, a less-advanced stage of industry and commerce than is to be found in the countries of western Europe is associated with a less highly developed system of transportation. The Danube extends through Austria and Hungary to the Black Sea. The Moldau is also a principal river of Austria; in Hungary are the Theiss, the Drave and other rivers. Of all these it is a marked characteristic that they carry but little sediment in suspension. Both countries, especially Hungary, of which during an earlier geological era nearly one-half was a great lake, were long subject to frequent and excessive inundations from overflows. These have been prevented and navigation has been facilitated by the regulation of the streams; that is, by the building of rigid walls to confine their currents and by the making of cuts through bends to render the channels less tortuous. The first expenditure for such improvements seems to have been upon the Moldau in 1640. Further expenditures, of which there is no definite record, were made upon one river and another during the next 200 years; but a comprehensive plan for the improvement even of the Danube was not put into execution until 1860, four years after the tolls upon that river had been abolished by the Treaty of Paris. Practically all the rivers in both Austria and Hungary are now regulated. The principal river improvement in Hungary has been the clearing of the channel of the Danube at Orsova,

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through a series of formidable rocks known as the Iron Gates, which caused rapids and whirlpools that were a menace to navigation.

In neither country has there been much canal construction. A canal was built through Vienna from one point on the Danube to another in 1867, and in one or two places access to the Adriatic was facilitated by the construction of canals. A canal projected to connected the Moldau with the Danube has been completed to a length of 56 miles, and another from Parkowitz to Melnik for a distance of 80 miles. In Hungary the Francis canal was built between 1840 and 1850, but is now little used. The only really serviceable canal in this country at the present time is that which connects the Danube and the Theiss. It is 88 miles in length and occupies the channel of a very old canal; the reconstruction cost about $40,000 a mile. During the 40 years beginning with 1867, the Hungarian government appropriated over $48,000,000 for the improvement of waterways, and over $5,250,000 for the maintenance of existing constructions. In 1908 it voted an additional $39,000,000, to be used in yearly instalments of $1,500,000. Dykes in the lowlands, constructed by associations of landowners at a cost of about $71,000,000, have been placed under government supervision and receive from the government an annual subsidy of about $1,200,000. At this time only about 50,000 acres of Hungary remain subject to serious floods, and

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the various cuttings have reduced the previous extent of the rivers by 1065 miles.

The total length of rivers and canals in Austria navigable for steamers is 830 miles; for barges and rafts, an additional 3370 miles; and for rafts only, an additional 2400 miles, or 6600 miles in all. In Hungary 1924 miles are navigable for steamers and an additional 1165 miles for small boats and rafts. Steamers along the Theiss, the connecting canal and the Danube carry grain from Hungary to Vienna, but have little return loading, obtaining only a small share of Austrian and German manufactures for Hungary, the Balkan States and Turkey. By far the greater use of the tributary streams of both countries is for the conveyance of rafts of logs and lumber. The only ports of either country are on the Adriatic, Trieste in Austria and Fiume in Hungary, and these are accessible only by rail.

Neither Austria nor Hungary charges tolls for the use of the inland waterways, except that Hungary, by international agreement, is permitted to charge tolls for the use of the channel made by it through the Iron Gates, inasmuch as this improvement is of benefit to the commerce not only of Hungary but also of Austria and the Balkan States. In Austria the entire capital expenditure and the cost of maintenance were formerly borne by the national government, but now the cities and the provinces are compelled to participate. In Hungary the entire capital and maintenance expenditure is

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borne by the state, except that upon the canal connecting the Theiss and the Danube: this is controlled by a private company under the supervision of the government, and on it tolls are charged which permit the company to pay one and one-half per cent. interest to the bondholders. Moreover, the two national lines of steamers on the Danube receive an annual subsidy of 800,000 florins, or about $400,000 each, the only return for which is their obligation to devote their boats to the use of the government in time of war. Upon the rivers and canals in Hungary a transport tax was levied by the government for a period of about 16 years, but the revenue was turned into the general budget. This aroused complaint from the owners of the watercraft, which led to the abolition of the impost. Most of the boats that ply upon the streams of the two countries are paddle steamers and modern barges, owned in most instances by companies. Many projects for further canal construction have been discussed, both in Austria and in Hungary, and for certain of these projects definite plans and estimates have been made. The whole matter is subject to the exigencies of politics, and schemes are advanced or withdrawn as one party or another comes into power.

Waterways of Italy

In northern Italy are Lakes Maggiore, Como, Lugano and Garda, which are navigable, but the traffic is principally of passengers, the freight boats carrying only from five to 40 tons each. The riv-

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ers of Italy are little used for navigation, except the Po, the Adige and the few other streams in the plain between the Apennines and the Alps, all of which flow into the Adriatic. The Po is navigable for 368 miles, a much longer stretch than is available on any of the other rivers. The Arno and the Tiber, flowing into the Mediterranean, are used for short distances only, as are also a few other unimportant streams in Tuscany and in the Campagna.

In the making of artificial waterways Italy was in advance of the other countries of Europe, canals having been constructed, mainly to connect the rivers and lakes of northern Italy, in the eleventh and twelfth centuries. Venice, Bologna, Ferrara, Padua and Modena were improving rivers and building canals at about the same time. Throughout northeastern Italy was thus formed a network of waterways which were used not only for navigation, but for drainage, irrigation, protection from inundation and production of power. Two smaller canals were built tributary to the Arno and the Tiber, but they have never been of much use. The existing canals are substantially those constructed in the Middle Ages. As their depth rarely exceeds six feet and the water is mainly used for other purposes, they are in but small measure available for navigation. The traffic has decreased sensibly in the last 50 years, and is now estimated to be about 5,000,000 tons per annum. Most of the boats are drawn by animal power, al-

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though in recent years a few craft propelled by steam or gasoline engines have been placed in use. The waterways leading from the higher ground were once largely used for the floating of lumber, but in the last 30 years this has greatly diminished.

The total length of the navigable waterways of Italy is about 2000 miles. The rivers and canals of northern Italy connected with the Po measure nearly 1500 miles, and the navigable canals constitute about one-third of the entire mileage. The state bears the expense of maintenance of the waterways that are of general navigable use. In the maintenance of purely local waterways, the provinces are aided by the state, and the expense is also shared by various associations of persons particularly benefited. No tolls are charged for the use of lakes and rivers; but tolls are charged under special laws for the use of certain canals. There has been but little capital expenditure upon the interior waterways of Italy during recent generations. For the maintenance of these waterways the government, from 1874 to 1901, expended about $230,000 per year.

It is to be regretted that the lack of adequate statistics in some countries, and the lack of uniformity in the bases upon which statistics are tabulated in others, prevents a complete comparison of the waterway traffic of the several countries.

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CHAPTER III

THE DEVELOPMENT OF THE RAILWAYS

WHEN the application of steam to locomotion was first considered, it was found, by experiment, that the ordinary landways were unavailable; that adequate support for the heavy locomotives could be given only by an especially constructed roadbed of exceptional solidity; and that frictional resistance was greatly diminished when the wheels ran on rails. In the neighborhood of Newcastle-upon-Tyne a wooden railway, connecting a colliery with the river, existed prior to 1676; in the Harz Mountains in Germany wooden railways were in use 100 years or so earlier. These wooden railways were the progenitors, in a way, of the modern steam railroads; but 20 or 30 years of experiment were required before roadbed, rails and rolling stock were so adapted to one another as to indicate the possibilities of the new means of transportation by land. During this period the building of railroads was furthered for the most part by private capital, furnished by those who were willing to incur risk for the chance of future gain; and, of course, the first railroads were built in those countries where

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individual enterprise was greatest—in England and in the United States. The first English railroad was opened in 1825; the first American railroad in 1829. In these two countries the construction of railroads extended rapidly. In England capital was provided entirely by private investors. In the United States subscriptions of private investors were often augmented by the contributions of cities, counties and states, and finally by aid from the national government. The gradual perception of the usefulness of the railroads in opening up vast regions as yet unsettled led the federal government to grant to many of them large tracts of land, and increasing evidence of the need of better communication between remote parts of the country induced it to extend to the first line between the Missouri River and the Pacific Coast direct pecuniary aid.

Political conditions and railroad construction

When railroad building began, none of the principal countries of continental Europe, except France, was under constitutional government, and until 1830 the French government was anything but liberal. The prevailing form of government was absolutistic and bureaucratic, and the administration of that paternalistic police type which does not tend to the stimulation of individual enterprise. All the Continental countries were impoverished by war, and the existing governments were none too stable. Therefore, the capital of individual investors did not readily flow into the construction and maintenance of extensive railroad systems. The indus-

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trial framework was, in the main, that established in the Middle Ages, and such commerce as there was moved principally along the waterways. There were no vast unsettled areas to be opened; the railroad question was simply a question of the adoption of a new instrumentality to supplement or replace the highroads and the waterways. When the experimental stage was passed, it became evident that the new means of transportation could be made to serve a purpose to which little thought was given in the United States. Every nation of the Continent was mindful of the possibility of war with neighboring nations; and the railroads would serve admirably for mobilizing armies and for moving troops, munition and supplies to the frontiers. Through control of the railroads, moreover, the governments would have a great advantage in case of attempted revolution. Even governments, however, did not always find it easy to obtain the capital necessary for railroad building.

Railroad construction in the United States

After the close of the Civil War, the industry and commerce of the United States increased and extended until traffic of a volume unknown elsewhere was flowing in channels which wholly ignored the boundaries between the states, supplying the needs of a people whose capacity for consumption is many times greater than that of any other in the world. Within the same decade that marked the close of the American Civil War began the formative period of modern Europe. Piedmont, aided by France, had

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wrested Lombardy from Austria, and with the annexation of Venice and of Rome the Kingdom of Italy was extended throughout the peninsula; Austria came to terms with Hungary and formed the Dual Monarchy; Bismarck welded 20-odd German states and cities into the German Empire; the third French Republic was formed. Western Europe entered upon a period of comparative peace. Although burdened with debt and taxation and the support of heavy military establishments, the people had a larger opportunity than ever before to turn their energy to industry and commerce; but in all that interweaving of effort which follows an increasingly elaborated division of labor they were and they remain far behind the United States.

Progress in Europe

The history of the development of the French railroads is instructively set forth by Clement Colson, inspector-general of bridges and highways, councillor of state, formerly director of railroads in the Ministry of Public Works, in his book, "Transports et Tarifs." The origin of railways in France is found in the two lines constructed in 1823 and 1826, with horses as the motive power, to connect the coal field of Saint Etienne with the Rhone on the one side and the Loire on the other. Concessions for lines between Paris and St. Germain and Versailles were awarded in 1835 and 1836. Then the nation spent seven years discussing what should be done next. As everywhere, one party wished to make the railroads a governmental insti-

Railways in France

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tution and another to give them the character of private enterprises. By 1842, over 4000 miles of railroads had been built in the United States, and nearly as many in Europe, of which but about 350 miles were in France. A law enacted on June 11, 1842, ordered the construction of the nine lines that constitute to-day the main arteries of the French network. Seven of these lines focus at Paris: one from Nancy and Strassburg, one from Marseilles and Lyons, one from Toulouse and Bourges, one from Bayonne, Bordeaux and Tours, one from Nantes, one from Havre and Rouen, one from Belgium and Lille; and there are two transverse lines, one from Bordeaux to Marseilles by way of Toulouse, and one from Mulhouse to Dijon.

The French concessions

To secure the establishment of these lines, the government offered concessions, stipulating that the state should construct the roadbed and the structures, that the localities through which the lines were to pass should pay two-thirds of the cost of acquiring the real estate, and that the concessionary companies should provide the track and its appurtenances and the rolling-stock, and should conduct the operations. Upon the expiration of each concession the permanent way and the equipment were to be taken over by the government at an expert valuation.

In the attempt to carry out this attractive plan, the first difficulty encountered was the outcry of the local communities, who found that their obligation

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to meet even two-thirds of the cost of the real estate was giving rise to excessive claims and placing them under heavy burdens. The government therefore relieved the communities by assuming, in 1845, the entire purchase of the real estate. Public infatuation led to such a wholesale demand for the securities of the companies that promoters entered into unreasonable competition to obtain concessions; in some instances they accepted concessions for the brief period of 27 years; in other instances they assumed the expense of providing the roadbed and structures, even reimbursing the government for outlays already made for these purposes. Speculation became so rampant that laws were passed to repress the trading in what were only promises of shares, and finally promoters were forbidden to receive more than the payment of advances actually made by them. Notwithstanding these restraints, the speculation fever ran its course and was followed by the inevitable depreciation and the panic of 1847. A number of companies found it impossible to collect the capital necessary for the prosecution of the enterprises to which they were pledged. While the government did not consider itself obliged to assume losses caused by speculation, it nevertheless believed, in view of the general interests involved, that it should not allow the railway bonds to depreciate unduly, since these were instruments necessary to the development of the railways, and it desired to reduce as far as

Speculation and panic of 1847

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possible the losses incurred by those who in good faith had invested their capital for the purpose of constructing works of public utility. In 1847, therefore, the government extended the periods fixed for the completion of several of the lines and granted aid to the concessionaries in various ways, at times even by advancing money. Even such liberal aid did not serve to place all the companies on their feet, and the government was obliged to go further: thus, for example, it took over the railway from Paris to Lyons, paying back to the shareholders the capital expended.

At the inauguration of the Second Empire it was desired to conciliate the large business interests, and, as one measure to this end, the duration of the railway concessions was extended to 99 years. At the same time the companies were charged with the total expense of construction, for roadbed and structures as well as for roadway and equipment. It was believed that at the end of the extended period the government, by reason of the development of traffic and the amortization of capital, would come into possession of the properties without other expenditure than that for the equipment, tools and material.

Construction of secondary lines

The nine lines of railway planned in 1842, which subsequently came under the control of what are known as the Six Great Companies, served well enough as main arteries of traffic, but they did not meet the demands of various sections of the inte-

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rior, especially of places that needed connection with these main arteries. This led to the construction of a large number of secondary lines under divers concessions. The easier conditions brought about by the extension of the main concessions were a large factor in leading the principal companies to absorb into their systems these secondary lines and also to accept concessions for numerous other branches from the main arteries. These lines, although they increased the traffic of the main systems, were in themselves often unprofitable. The great companies had accepted so many of these concessions that, during the six years ending with 1857, they had expended more than $400,000,000 upon the construction of branch lines and would need to expend as much more before their completion. The enormous amount of these outlays and obligations and uncertainty as to the traffic which would come to the secondary lines created public apprehension, and the ensuing panic of 1857 produced, as regards these secondary lines, a repetition of the phenomena which had characterized the situation in regard to the main lines during the crisis of 10 years before. Again the companies found it difficult to place the bonds necessary to continue their works and again it was necessary to appeal to the government, which, by way of relief and encouragement, gave the guaranties of interest payments which still underlie the financial régime of the railways of France.

Panic of 1857

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The government guaranties

Upon the premise that the new secondary railways were necessary to the development of the country and that the crisis was caused by their construction under the terms of the concessions that had been accepted by the great companies, the government separated the old network of the main arteries from the new network of the secondary lines. For the old network no guaranty was given. Its net revenue was, however, reserved to the companies until the accumulation of sums necessary (1) to pay the charges on bonds issued to cover construction, (2) to pay dividends on the stock. The remainder of any surplus income of the old network was to be applied to the new network, to reduce the amount for which the government was liable in order to meet its guaranty. For the new network the state guaranteed to the companies until 1914 a net annual revenue sufficient to secure the interest and amortization. The sums paid by the government under its guaranty were to be considered not as grants but as advances, bearing interest at four per cent. When the net income of the two networks combined should exceed the sum of the revenue reserved for the old network and the interest guaranteed for the new, the excess was to be turned over to the government annually until it had received full repayment of its advances, including both capital and interest. As security the government required mortgages on the equipment and the plant. It was also stipulated that if the

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companies, after having extinguished their debt towards the government, should realize a net income exceeding a certain limit, one-half of such excess income should accrue to the government. The government considered the arrangement wise, inasmuch as the companies were obliged to construct and operate the conceded lines and to pay back the advances made by the state. It, moreover, wished to consolidate their credit, to assure the public of their solvency.

These arrangements quickly advanced the credit of the companies, enabling them not only to prosecute the construction of the lines already conceded, but to obtain a series of new concessions, including lines traversing rough country of scant traffic, where construction would be costly and revenue small. To construct these lines under the guaranty of interest would have increased the amount of the companies' "advance account" and would have prolonged the period during which they would be bound to the government. They, therefore, accepted such concessions only with accompanying grants, which, though covering but a part of the expenses, were really important subsidies. The companies frequently borrowed capital on the basis of these grants, the government binding itself to pay the interest and the amortization of the bonds thus issued.

The guaranty of interest was also extended to capital employed in additional and complementary

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works undertaken as the traffic of the lines increased. The government considered that, inasmuch as it had become a partner in the financial result of the operation, it had every interest to encourage it. It is, moreover, evident that the companies would not have extended their systems if the charges on the capital expended therefor had had to be borne by the shareholders while the increase in the revenue had gone to the government. The guaranty of interest was also extended to include the participation of each company in the belt line around Paris, and the Company of the East was indemnified for the losses sustained during the Franco-Prussian War.

Growth of demand for railroads

The constant demand of regions not traversed by railroads for such means of communication led the government to grant still further concessions. The great companies had learned that it was not advisable to include in their networks too many lines of small earning capacity, and therefore a law was passed in 1865, giving to the departments the power to participate in the construction of a number of such railways, designated as lines of local interest. The national treasury, however, usually subscribed from one-quarter to one-half of the capital; and in some cases, where no concessionary offered conditions that seemed acceptable, the central government itself undertook the construction of new lines, reserving the right to decide later as to their operation. By 1875 lack of traffic brought

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these local lines into financial difficulties similar to those encountered during previous crises by the larger companies. Wild hopes gave place to the realization that many of these speculations had been imprudent and that the idea of deriving an adequate revenue from them was a dream. Two or three of the larger companies absorbed a few of the bankrupt roads, but the government was appealed to for aid to others. Again it was considered that the government, which would in any event have insured the construction of these railways, ought not to profit by the imprudence of those who had furnished the funds for their establishment. At this time also there were complaints concerning the tariffs of the railroads, and this matter absorbed much of the attention of the government. In 1877 the Chamber of Deputies refused to allow the Orléans Company to incorporate the Charente lines unless it would agree that the state should have absolute control over its rates. The company declined to accept such a stipulation, which would have changed the terms of its charter. The state thereupon purchased this and certain tributary lines of a total length of about 1600 miles.

Crisis of 1875

Thus was created, in the west and southwest of France, a governmental network of lines which, from time to time, has been extended, and which forms a disconnected and incoherent system, here and there in competition with lines operated by the concessionary companies. A board of directors is

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named by the government, and the annual budget is voted by the Chamber of Deputies as a schedule attached to the general budget.

Proposed extension of governmental network

These governmental railways were organized during the ministry of de Freycinet, who also occupied himself very diligently with the extension of the existing network. A law of 1879 provided for the construction of additional lines over about 5500 miles, mostly through remote and mountainous districts, where construction was extraordinarily expensive. Many of these lines were projected, not to meet commercial needs, but because of the political pressure brought to bear in the Chamber of Deputies by the representatives from the different departments.

It was estimated that these lines would cost $700,000,000, and would be completed within ten years. It was a time of great prosperity, and loans were readily placed. For the three years 1880-82 the expenditures reached nearly $250,000,000. The purchase and construction of lines by the government made the state directly responsible for nearly 10,000 miles of lines scattered over the country, not connected with one another, but inclosed in the networks of the great companies. During this period of prosperity the receipts of all the railroad lines had greatly increased, and all but one of the great companies had begun to repay the advances received from the government. There was another crash, however, in 1882. Repayments by the railroads to

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the government stopped; and it was also found that the cost of the lines projected in 1879, and estimated at $700,000,000, would be $1,300,000,000. It was not deemed possible to throw this additional burden directly upon the taxpayers, in the governmental budget; and, if the works promised to the population were to be completed, it was necessary to appeal to the great companies.

The companies and the government's plans

Thereupon were made the conventions of 1883, which, with subsequent modifications, still regulate in almost all respects the financial relations between the companies and the government. The companies incorporated in their networks the greater part of the lines projected under the program of 1879, whether already constructed or to be constructed. Since many of these lines could never be remunerative, the companies took over only the rolling-stock and the works at $5000 per kilometer, agreeing to borrow the further capital necessary, under the guaranty that the government should pay to them the interest and the amortization. All distinctions between the old and the new systems were effaced, the state undertaking to advance the necessary funds to insure, besides payment of interest and redemption of bonds, a fixed dividend for shareholders. The war of tariffs between the government lines and the concessionary lines came to an end, competitive traffic being apportioned between the different systems. Special arrangements were made, under governmental guaranty, to insure the completion of a

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number of the smaller lines, difficult of construction, costly in operation, and of but little productivity, which the concessionary companies did not care to take over. The methods of this assurance have led to grave evils.

The capital of the railroads of France is very nearly $135,000 a mile. Their length in 1905 was 24,459 miles, an increase of 71 per cent since 1880.

Germany

The construction of steam railroads in Germany did not begin until several lines were well under way both in England and in the United States. The first railroad was a short local line between Nuremberg and Fürth, opened in 1832. Other similar lines were then built, to connect towns not far distant one from another, such as Dresden and Leipzig, Magdeburg and Leipzig, Berlin and Potsdam, Brunswick and Wolfenbuettel. The early development of the main lines was in an easterly and westerly direction in the interior. It seems probable that they were built at first in large measure to meet the needs of passenger traffic, as was clearly the case with the railroads parallel to the Rhine. As they were extended from place to place, interlacing throughout the various states, their freight traffic increased.

The first railways in Prussia were built by private companies, the state being unable to raise large funds for railway construction. Besides granting concessions to private companies, the state sometimes aided them by the direct purchase of shares and by

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the guaranty of interest. All such concessions provided that the state could take over the lines at will. About 1850, when larger funds were available, the state undertook the operation of a number of lines that were in financial difficulties, and entered upon the construction of a number of others to serve strategic as well as commercial purposes. In some of the other German states the railways were constructed and operated by the government, in some by private companies, while in others there appeared railways of both sorts, state owned and privately owned.

Because of the different regulations under which railroad transportation was conducted in the different states and the complications of the various railroad tariffs, the traffic of the German Confederation fell into a seemingly inextricable confusion. After the establishment of the Empire, a committee of investigation reported that "economic considerations point to the conclusion that all railways should be under the control of the state." Prince Bismarck formed a plan for the purchase of all the railways by the Empire; but to this project several of the states offered such strong opposition that it was abandoned. He then adopted the policy of purchase by the Prussian state. With the authorization of the Prussian Diet, the policy of securing entire state control of the Prussian railways was formally inaugurated in 1880, and within ten years this object was practically attained. Prussia not

Purchase by the state

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only acquired substantially all the main railway lines within its territory, but gained control of the principal routes in north Germany, although in many cases they extended beyond the Prussian boundaries. It thereby gained that dominant influence over the railway policy of the entire Empire which it still exercises.

The capital expenditures on the Prussian railways to 1905 were $2,286,000,000. The receipts for 1905 were $432,315,000, the expenses $262,075,000, leaving a surplus of $170,240,000, equivalent to nearly seven and one-half per cent on the capital.

Holland

In fogbound, waterlogged, amphibious Holland there might seem to be no need of railroads. The canals, indeed, have never been much used for the carrying of passengers, but there are landroads which have gradually attained a length of about 3000 miles, and the demand for passenger transportation in the interior of Holland has not been great. Yet there was need for railroads, and the story of their development is interestingly told by Edwin A. Pratt in his book, " Railways and Their Rates." William I, King of the Netherlands, had plans prepared in 1833 for a railway from Amsterdam to the south-eastern frontier, there to connect with a German line to Cologne. It was his belief that his country could not hold its own in international traffic unless the water thoroughfares were supplemented by more rapid means of transportation, along routes not blocked in winter as are the frozen waterways. The

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monarch, however, was unable to obtain the necessary capital; and the first Dutch line, from Amsterdam to Haarlem, was constructed in 1836 by a private company. A commission subsequently appointed reported that, although, as a rule, the building of railways should be left to private enterprise, a line from Amsterdam to the German frontier should be constructed by the state. The States General rejected the recommendation, but the patriotic monarch obtained the necessary capital upon his personal guaranty at four and one-half per cent interest. The government officials subsequently aided in the work of construction, and in the general operation. The cost of the line so far exceeded the estimates that at the time of his death, William I had paid out of his private fortune and to his absolute loss $500,000 in interest.

Private ownership

The management of the line speedily drifted into hopeless inefficiency, and in 1844 it was transferred with other concessions to a private company, which found it necessary to reconstruct the deplorably defective plant. After this was done there was no traffic, except at periods when low water or ice arrested navigation. At this point the coterie of Englishmen who had obtained the concession secured the services of a resourceful traffic manager, and the new manager worked out the idea that if full trainloads of coal could be secured at the Westphalian mines in Germany, they could be run through for consumption in Holland at a very low rate, and that

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the cars could obtain return loading, likewise at a very low rate, of Spanish iron ore from the Dutch ports. Both iron masters and colliery owners perceived the advantage that the exceedingly low rates for shipments in full trainloads would give them, and they contributed their efforts toward building up the traffic. It was not forthcoming in adequate volume, however, until the railroad company encouraged its agents to combine with their regular duties the business of coal dealers. In this way the consumption of Westphalian coal was increased in Holland, to the considerable displacement of the English coal which had formerly monopolized the markets. The railway company became so prosperous that its shares went to a premium.

The government lines

Two or three other lines were built by private capital in the next dozen or fifteen years, and these also had a hard struggle for existence. In 1860 the government perceived the necessity for additional rail communication, especially for the benefit of the northeastern provinces, which had no railway facilities whatever. Because of the necessity for numerous bridges and the difficulty of obtaining sure foundations, the cost of construction was high, and this discouraged the subscription of private capital. Therefore the government built a number of lines, and it also bought up certain small railways that were laboring under pecuniary difficulties. The direct operation of the railways by the state was regarded as undesirable, and in 1863 the government

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conceded to a Company for the Exploitation of the State Railways the permanent way and structures of the state lines, it being agreed that the company was to provide the rolling-stock and undertake the management.

In 1890 the government purchased the line to the German frontier, described above, with the branch lines which had been built as a result of the development of the trade in Westphalian coal; and in the same year it entered into a new arrangement, by which the operation of all the state lines is divided between the Company for the Exploitation of the State Railways and the Holland Iron Railway Company, each having the right to run trains over the lines of the other for the purpose of reaching towns to which it would otherwise have no access. The effect of this arrangement is to provide competing services to and from every place in the country; and as a result of this competition the Dutch railways run a great number of quick trains carrying goods in competition with the waterways at exceedingly low rates, with a speed and promptness for which quick-service charge would be made in either Germany or France. The state can take over the operation of the lines at any time after giving one year's notice.

Lease to corporations

The total length of line operated by these two companies is 1778 miles. There are about 400 miles of other lines, chiefly electric and suburban, operated by private companies. The investment

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of the government in the two principal systems is about $140,000,000; the total outstanding capitalization of the concessionary companies is $100,418,600.

As nearly as can be calculated from available data, the revenue of the operating companies from the transportation of passengers, baggage and freight during 1908 was $21,038,725, and their expenditure for maintenance and operation was $17,436,437. The revenue from passengers and baggage is about equal to that derived from freight. Freight charges have to be kept at the lowest possible scale in order to meet the competition of the waterways, and of the Prussian railways leading from the ports of Germany.

Belgium

The first railways in Belgium were built by the state. The first line, that from Brussels to Malines, was opened in 1835. The state continued to build railways until about 1840, but their operation yielded so little profit that charters were subsequently granted to private companies for the construction of other railroads that were needed.

The rates of the state railroads were from the outset specifically fixed on a definite basis. The charters of the private railroads specified a maximum; and for some time the rates of these railroads were in some instances higher than those charged on the railroads operated by the state. Subsequently, however, the private companies found it advisable to adopt the tables of rates fixed by the state; that is,

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the same nominal scale prevailed over both systems. This was partly brought about by a popular complaint that the private roads were not as accommodating as those owned by the government, that they did not make the same efforts to serve the poor people, but bent all their energies to securing as high profits as possible. Certain it is that their returns were far greater than those operated by the state. As they could do but little in the way of increasing traffic by a reduction of the rates, it was but natural that they should charge as much as they could and should keep down the expense of operation. This they were so successful in doing that their operating expenditures were markedly less than those of the state roads.

The state-owned and the privately owned lines found themselves in vigorous competition. Especial rates were accorded to individual shippers, and preferential contracts of one kind and another were made by both systems. This feature of the situation had its influence in causing the Belgian government to enter, about 1870, upon the purchase of the private lines. Another consideration which influenced the government was the difficulty of transportation over routes formed in part by state lines and in part by private lines, obstacles in the way of transhipment arising at the junctions and causing delay in the movement of traffic. The government also feared that the privately owned railways might be purchased by foreign financiers, perhaps by those of

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Germany, and that political complications might ensue.

In 1880 the length of all of the Belgian railways was 4112 kilometers; in 1904, 4552 kilometers; in 1907, 4562 kilometers, or 2828 miles. The total capital expenditures to 1905 for the government lines were 2,295,000,000 francs, or about $459,000,000.

Switzerland

Before the time of the railroads, Switzerland's avenues of communication with the outer world were principally through the mountain passes to Basel, and thence by the Rhine to the ports of Holland and of Germany, which compete with the port of Havre for the commerce of Switzerland. The lakes and their connecting waterways remain of importance for the conveyance of passengers, principally of the tourists for whom Switzerland is a favorite resort, but their usefulness in the transport of goods is not considerable.

The compact of 1848, by which the cantons were more firmly united, gave to the Swiss Confederation the national character essential to industrial and commercial growth. Custom-houses were abolished in the interior and established on the frontier. The nation was in a position to discuss propositions for material improvement, and the new means of transportation that had already attained a notable development in other countries was naturally among the first subjects to be considered.

The history of the Swiss railways is clearly and instructively set forth by Placid Weissenbach, presi-

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dent of the General Direction of the Swiss United Railways. A commission appointed in 1850 submitted a scheme for a system of railways designed to supply the transportation needs of the republic. Discussions as to whether the lines should be built and operated by the state or by private companies were conducted by men of ability. Those who favored state ownership pointed out that railways were but roads of greater importance, and that for this reason the nation should develop and maintain them; that the railways could only be developed to their full usefulness by being kept in the hands of the state; that, inasmuch as the railways of the surrounding countries were for the most part state-owned and state-operated, it would be doubtful if the railroads of Switzerland could properly protect their interests if they were not similarly organized and conducted; that, if the railways were left in private hands, there would be conflict between their owners, who would seek individual profit, and the state, whose aim would be to utilize them in the national interests; that private companies would seek to develop only those railways that promised commercial profit, to the neglect of the lines needed for the postal service and for military purposes; that the private railways, with their large staffs of officers and employees, could be formed into an organization that would be a state within the state, susceptible of use in opposition to the national welfare. On the other hand, it was argued that the construction

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and operation of railways by private companies would be cheaper and more efficient, as their interest would be in the direction of economy and efficiency; that in the light of previous experience, the activities of private companies could be so regulated as to prevent injury to the community; that it was beyond the province of the state to incur expenditure for other purposes than the national defense; that the construction or subvention of railway lines would involve the state in obligations more extended than it ought to assume; that for the government to take shares in different companies would be to make it a factor in the stock market; and that subventions of the government to enterprises whose profit was not assured was inexpedient in practice and unsound in principle.

The latter views prevailed. The feeling against national control of the railways became so strong that, by a statute of June, 1852, the Confederation was divested of power to grant concessions for railway building, this authority being left with the cantons. The law provided that the railroads should be built by private enterprise under authorization from the cantons. New projects must be submitted to the Confederation, but the federal approval must be given unless it was apparent that the execution of the projects would be to the disadvantage of the country from a military standpoint.

Cantonal concessions

The first railroad in Switzerland had been built by private capital, to connect the eastern cantons by

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way of the Rhine valley with Basel, which had had rail communication with Germany since 1844. This line was opened in 1847. Further rail construction was deferred pending the organization of the Confederation and the determination of its attitude towards the new means of communication.

Under the régime inaugurated by the law of 1852, there were constructed in the next ten years 716 miles of railway, connecting one and another of the principal towns of Switzerland. It was with great difficulty that capital was obtained; the lines were completed only through pecuniary aid extended by the cantons and at great loss to the private investors. Notwithstanding this, additional lines were projected to meet the growing demand. To encourage the building of the railways the cantons were liberal in extending privileges to the railway companies. As the lines were completed, they came into antagonism with each other and with the cantons, and their tariffs were the cause of public complaint. As in many cases one railway traversed two or more cantons, it was difficult to bring it under regulation. Cantonal disagreement reached a crisis in the discussion leading to the convention between Germany, Italy, and Switzerland for the building of the St. Gothard tunnel. The law of 1852 had been drawn especially to define the relations between the private railway companies and the cantons. It did not particularly enter into the relations between the cantons and the Confederation in the control of rail-

Cantonal friction

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Extension of federal authority

ways. By 1869 a readjustment admittedly was necessary. After much discussion and not a little friction, a new law was enacted on December 23, 1872, which vested the general control of the larger transportation questions in the federal government. The Confederation was no longer restricted to the consideration of such concessions as came up to it through the cantons, and it was no longer bound to give its consent unless the concessions seemed inimical to the military interests of the country; it was empowered, on the contrary, to pass upon concessions directly, and the law especially enjoined that it promote means of communication with Italy and the Mediterranean. The law also imposed penalties upon derelict concessionaries, and provided for uniformity in construction and in methods of operation throughout the Confederation. The federal government was given absolute authority over tariffs, and provision was made for the settlement of disputes between the railways and the Confederation. It was definitely stated that, while it was not intended to deprive the cantons of their proper jurisdiction, it was the purpose of the law to make the control of the railways national rather than cantonal. One reason for the change was the arbitrary attitude often assumed by the railroad companies; another was the necessity for the maintenance of a national policy that would not deter investment in new and needed lines.

By 1884 concessions under the new law had

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brought the length of the Swiss railways up to 1653 miles. The capital expenditure up to this time amounted to over $176,000,000, the average per mile exceeding $100,000.

The original concessions of many of the railway companies provided for optional purchase by the government at the end of a specified period. Many of these periods terminated during the decade beginning with 1880. In 1883 the Federal Council took up the question of purchase, and, after due consideration reported that the capitalization of the railways was too high, and that they had paid larger dividends than ought to be allowed in the future, but that the financial condition of the Confederation was such as to prohibit any definite proposal that it should avail itself of the repurchase provisions of the concessions. The National Assembly accepted this view and expressed itself as opposed to repurchase at that time by a vote of 67 to 59.

This question, however, had been for many years and continued to be a leading topic of public discussion. Those in favor of governmental purchase pointed out that the railroads of adjoining countries were passing into the hands of the state, citing in particular the action of Prussia. They argued that, if the Swiss government followed these precedents, tariffs could be reduced for the benefit of commerce, and that the profits of the lines would inure to the government instead of to the private companies, which were largely owned in foreign countries. The

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Purchase by the state

accumulation of public opinion in favor of government purchase led to the enactment in 1897 of a law authorizing such purchase and specifying the conditions under which it was to be effected. It was stated that the uniform operation of the lines was a desideratum; that if it were not undertaken by the government, it would probably be secured sooner or later by a large share-holding company; that such a company would seek the greatest profit, whereas the government would operate the lines as highways for the benefit of the nation; that the centralized governmental administration would be more economical than that of the private companies; that tariffs could be reduced and made uniform; that the state would make use of the profits for the development of the lines, and not to aid in meeting its general expenditure, and would accordingly make expenditures for development that a private company would not be willing to incur. The law provided that the government should take over, first, the main networks of lines that were of principal service to the commercial and military interests of the country. These extended over 1703 miles, and the estimated cost of taking them over, including certain supplementary lines, and the provision of adequate working capital, was about $200,000,000.

Pursuant to this law, lines have been purchased by the government aggregating on December 31, 1909, 1825 miles, leaving 973 miles outstanding in the hands of private companies.

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Russia for many centuries has been an agricultural country, and the vast majority of its population has been primarily occupied in tilling the soil. During the long winters, however, these farmers and their families engaged also in handiwork, making boots of felt and clothing of skins, weaving wool and cotton on handlooms, hammering out the copper utensils and fashioning the woodenware of ordinary use. Not until the time of Peter the Great was there any noteworthy attempt to develop less primitive processes of manufacture, or to provide facilities for exchange superior to those afforded by the fairs held once or twice a year at some three thousand places in the Empire. Russia,

It was Peter the Great who opened the first canals, encouraged the construction of the first linen factories, laid the foundation of the manufacture of woolen goods, took measures leading to the establishment of the first silk-weaving factories, placed the paper-making industry on a firmer footing, imported curriers to improve the processes of manufacturing leather, protected the quality of silver and gold manufactures, and developed the metallurgical industry. Incidentally, having studied shipbuilding in Holland, he developed the Russian navy, working in the shipyards with his own hands, and he founded the first works for the building of machinery.

The system of village communities, under which great portions of the land of the Empire have been tilled by groups of peasants, the communal adminis-

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tration being conducted, under the supervision of an imperial official, by the peasants themselves, has endured in Russia for many centuries. Local attachment to the soil was enhanced when, in 1864. the serfs were freed and land was allotted among them under an arrangement for buying off the rights of the former proprietors by annual payments extending over long terms. The tenacity with which the typical Russian clings to the soil has done much to neutralize the impetus which Peter the Great gave to the manufacturing industries and to retard their development. A very great number of the workmen in the factories, even in the towns and cities, are peasants who till their own bits of land during the open season, resorting to the shops only in winter.

its earliest railroads

Under these conditions a rapid extension of railroads in Russia was scarcely to be expected. The first railway was a short line, built in 1836, to connect the Czar's palace at Tzarskoe Selo with St. Petersburg. The next line was that between St. Petersburg and Moscow, celebrated as having been built under the Czar's dictum that it pursue an absolutely straight line, the dispute between contentious engineers, each of whom favored a different route, being thereby settled. This line was completed in 1846. During the next twenty years, there was not a great deal of railroad building; and the roads that were built were constructed directly by the government to serve military and strategical purposes. About 1860, however, it became evident that the

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great natural resources of the Empire were susceptible of tremendous development, and both Russian and foreign capital was enlisted in the construction of railways to serve commercial needs. The government in practically all cases issued bonds to the projectors, guaranteeing the interest and, in some cases, it guaranteed dividends on shares.

The length of railways in European Russia on December 1, 1909, was 31,345 miles of the standard gage, which is five feet. In addition there were 1355 miles of lines of narrow gage and secondary importance. These figures are exclusive of 1976 miles in the Grand Duchy of Finland. Of the standard-gage lines in European Russia the government owns and operates about 20,000 miles; private companies, about 11,000 miles. The average cost of these lines per mile has been about $40,000. In 1908, the railroads of the Empire, including 9000 miles in Asiatic Russia, carried 145,000,000 passengers and 180,619,596 tons of freight, the revenue per mile averaging over $10,500.

Austria

The first concession for a steam railway in Austria was given on March 4, 1836, for a line from Vienna to Galicia, which was opened in 1837. The next concession was granted in 1839 for a line from Vienna to Raab and Gloggnitz. These were built by private capital, but the concessions reserved to the state the right to take over and work the lines. By 1840, 90 miles had been placed in operation. These did not prove profitable and requests were made for

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state assistance. Perceiving that private capital could not be relied upon for the building of an adequate railway system, the government adopted on December 19, 1841, a program for the construction of a network of state railways. This comprised a line from Vienna by way of Prague to the Saxon frontier at Bodenbach, and another from Vienna to Trieste on the Adriatic. The construction of small short lines was left to private companies.

The operation of the private lines continued to be unprofitable. The state extended aid by the purchase of shares, incurring in this manner an expense that by the end of 1848 amounted to 26,000,000 florins, or about $13,000,000. The government thereupon adopted the policy of taking over all of the lines. This brought heavier burdens than were anticipated. The receipts of the railroads taken over did not meet expectations; and the political situation, in which the necessity of obtaining money for general purposes was an important factor, led to a further alteration in the status of the railways. Under the belief then held, that projected lines would be carried to completion more rapidly by private companies, a new law was enacted on September 14, 1854, which lengthened the duration of the concessions from 50 to 90 years but retained for the government a large share of influence in the administration.

A number of new companies was formed, largely by the aid of foreign capital, and in 1858 the state

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lines, aggregating at this time 1488 miles, were taken over by the private companies. Notwithstanding the financial crisis of 1857 and the depression caused by the war of 1859, the railroads of Austria rapidly extended until the commercial crisis of 1873. This not only checked the subscription of private capital for further construction, but involved the existing lines in great pecuniary difficulties. A number of derelict concessions were canceled; construction under way was absolutely terminated; and the private companies made heavy demands for assistance, which the government was obliged to grant. The following years were a period of transition. The necessity of constructing useful lines and the desire to better the bad condition of the workingmen, in connection with the unwillingness of financial circles to participate in railway enterprises, caused the commencement of a new era of direct participation by the state in construction and operation. In 1876 it entered upon the construction of a number of small lines, and it was soon obliged to take over several private lines that were hopelessly involved. This policy has continued until, in 1906, of the 13,388 miles of railway in Austria the state operated 67.95 per cent.

Hungary

In Hungary the first railway was built in 1846, but further development was not rapid. The first construction was by private companies; but the state had given guaranties of which these companies were obliged to avail themselves. The drain upon the

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treasury became so considerable that here also nationalization resulted, and it has gone even further than in Austria. Of the 12,951 miles in Hungary in 1908, 83.5 per cent were worked by the state. In this percentage, as above in the percentage of lines worked by the Austrian state, are included both the lines owned directly by the government and the lines operated by it on behalf of private companies. Concessions for new lines are still made in each country, but under strict requirements, and they are not sought except for lines of secondary importance.

Italy

When railroads were introduced Italy was still "a geographical expression:" politically, it consisted of a number of separate states. The construction of the first railway in the peninsula was undertaken under a concession from the Neapolitan government in 1836. It extended but 32 miles from Naples to two towns in the vicinity, and it was not completed until 1860. In 1837 concession was granted for a line between Milan and Como, which was completed in 1849. These lines answered the purpose of pleasure travel rather than any commercial need. In 1842 the kingdom of Naples entered upon the construction at state expense of a line extending for about thirty miles to Caserta, where was the king's palace, and to Capua, the site of an important fortress. Another road undertaken by the state was completed for about 20 miles.

Railroads intended to meet the needs of commerce

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were first begun in Venice and Lombardy under the auspices of the Austrian government, then the sovereign of these provinces. The first line was that covering the 189 miles from Milan to Venice, completed in 1857. It was begun under a concession, but it was taken over and completed by the government, which desired its construction for military ends.

Austria and the Italian roads

Austria also built directly another line or two in its Italian provinces, and then brought about an agreement between the different states for the construction by a private corporation of a line through central Italy. The concession was for 100 years, and the company was granted exemption from taxes and duties, as well as a guaranty of five per cent interest on its capital, the amount of which was not stipulated. Because of the unsettled conditions due to the Crimean War, the company was unable to obtain capital and in other respects demonstrated its incompetency. The governments concerned conceded the line to another company, which by the time of the war of Piedmont and France with Austria (1859) had made much progress.

Concessions of the Italian states

Parma and Tuscany had also made concessions to private companies; these companies in many cases were unable to carry out their contracts, became bankrupt and applied for assistance to these states, which made further concessions. Piedmont granted a concession to a private company for the building of a line between Turin and Genoa, which was opened in

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1854. To other lines the state of Piedmont extended pecuniary assistance; in some cases by way of capital subscription, in other cases by guaranty of interest, in other cases still by taking over the lines and agreeing to operate them for 50 per cent of the revenue. The state of Rome also made concessions to private companies. These, however, proved delinquent; in some cases they engaged in speculation instead of construction. This in one instance led to the disappearance of the cash, which was followed by the arrest and imprisonment of the chief culprit. The company was saved from bankruptcy by the government, which desired railroad communication with two neighboring provinces which it had just annexed.

Unification of the Italian system

The Italian kingdom thus found its railways in various tangles. In some cases they had been built by a government; in others under concessions, sometimes with guaranty of interest, and many concessionaries were delinquent. At the meeting of the first Italian Parliament, in 1860, there were in operation in the whole of Italy 1308 miles of railway, and 1245 miles were in the course of construction or under concession. The lines were mostly in small and incomplete systems that were not connected one with another. In order to create a unified railway system, the new government therefore found it necessary not only to secure the prosecution of the existing projects, but to connect the different lines. Given the different conditions under which they were

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to be constructed and the different companies and concessionaries that still had rights to be respected, the task was one of exceeding difficulty.

Guaranties made by the Austrian government to the lines in Lombardy were continued, and further privileges were accorded which permitted the extension of the lines. Further concessions were made to other private companies. Within two years after the installation of the new government, 257 miles of new lines had been constructed. In its anxiety to assure the people that it intended to provide for their needs, the government made many disadvantageous concessions, and in some instances it was later obliged to take over and complete the lines. For example, English capitalists who had obtained a concession for lines in the province of Genoa were unable to carry out their contract and forfeited 500,000 francs which they had deposited as guaranty.

By 1863 lines were completed to a length of nearly 2200 miles; and others were projected or under construction to the extent of nearly 2600 miles, calling for a capital of not less than $200,000,000.

Because of the political and financial conditions in general and because the concessions had been distributed among a great number of companies, capital was very difficult to obtain, securities being often negotiated at far less than their face value. The government finally decided that it would be better, as a step toward unification of the entire

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Italian railway system, to combine all the projects. A company was formed for this purpose, but there was ceded to it only a fraction of the lines, difficulties arising in connection with the transfer of the others. Other projects looking to the cession of the state lines to private companies were similarly unsuccessful.

The four companies period

A commission was finally appointed to devise a plan. Its report, favoring the purchase of the lines, brought about a long discussion in Parliament, which resulted in the adoption of the law of 1865. This law provided for the cession of the railroads to four companies. The Company of Northern Italy took the lines of Piedmont, Lombardy and Venice; the Company of Tuscany the lines of Tuscany, the Roman provinces and Liguria; the Southern Company the lines to the south of Rome as far as Calabria; the Victor Emmanuel Company the lines of Calabria and Sicily. The Sardinian railroads were ceded to a fifth and separate company. From the governmental point of view, the arrangement was highly satisfactory, as it brought in $40,000,000 in cash at a time when the government was in urgent need of money and would have been obliged to increase its outstanding loans upon very unfavorable terms. The various lines had been so distributed as to secure a certain competition between one system and another. Although the building of lines by the state had practically been brought to an end, the government continued to assume a

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certain responsibility in helping the private companies to meet their obligations under previous contracts.

It was hoped that the arrangement would endure for many years; but this hope soon failed, because of the weakness of two of the companies and because of the financial stress imposed by the war of 1866 with Austria. The companies could not obtain the needed additional capital. The government was called upon for subventions which were not yet due, but which it was obliged to pay, as it could not face the national discredit that would follow upon the ruin of the railroads.

The company operating the lines in Sicily and Calabria could not meet its obligations, and the concession was annulled by the government in 1867. The company operating the lines in the Roman provinces and Tuscany next got into trouble; in 1868 the state relieved it of further responsibilities in connection with the Ligurian railway and bought back other portions of the lines that had been ceded to it; but inasmuch as the government could not raise the $9,000,000 required to complete this purchase it turned the lines over to the more prosperous Company of the North. The company operating the lines to the south of Rome had also become involved, making necessary heavy drafts upon the national treasury. In the face of increasing disaster to one company after another, expedient after expedient was adopted by the government, until

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Again state ownership

finally, in obedience to growing popular sentiment that the ownership and control of all the railroads should be vested in the state, it determined in 1875 to repurchase the lines, including even those in the north of Italy that had been fairly prosperous under the concessionary company. In 1876 the greater part of the Italian lines that only 11 years before had been ceded to private corporations were again in the hands of the government; and negotiations subsequently completed with the Austrian government secured to Italy complete ownership of the northern lines. At this time there were about 5000 miles in operation.

The lines of the peninsula were divided longitudinally into two systems, the Mediterranean and the Adriatic, the Sicilian lines being operated separately. One ministry after another took up the question of the extension of the railroad system, and in 1879 a law was passed authorizing the expenditure of $252,000,000 for the construction of supplementary lines, which were to be operated by private corporations.

Lease to corporations

A project brought forward in 1879 for leasing the Mediterranean and Adriatic companies to private corporations was finally carried out. Under the arrangement made with the lessees the government was to receive a rental of $9,000,000 a year.

The government had made and continued to make large appropriations for the supplementary lines. These had been badly surveyed. A multiplicity of

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offices had been created and filled with incompetent incumbents, whose conflicting opinions led to general mismanagement. Construction had been inaugurated that vastly exceeded the appropriations. These unsatisfactory conditions led to a general investigation.

In 1884 revisions were made in the plan of operation of the Mediterranean and Adriatic systems, and capitalists of Sicily were brought into the administration of the lines of that island.

The matter of extending aid to the railroads came up at every session of Parliament. One appropriation after another, supplemented by contributions from provinces and communities, was made for repairs and improvements and for the purchase of rolling-stock. By 1899 the governmental subvention to the supplementary lines amounted to from $1200 to $1500 per mile, but with all the assistance that they had received these lines were not completed and a royal commission was appointed to devise ways and means. **The government expenditures**

Large expenditures had also been made upon the lines in Sardinia, and for the construction of the Mont Cenis, St. Gothard and Simplon tunnels and the approaches thereto.

The capital expenditure made by the government up to June 30, 1903, was officially stated to be $980,000,000. This covered 10,320 kilometers, making the average per mile over $150,000. The total expenditure of the government up to this time for

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initial capital, guaranty of interest and subventions amounted to very nearly $1,300,000,000, not including the payment, to be made in annual instalments until 1954, of the $6,600,000 due the Austrian government on the purchase of the railroads of Lombardy. The annual payments for which the state had made itself responsible on account of the railroads approximated $50,000,000, which was about one-seventh of the annual revenues of the kingdom. As an offset, taxation imposed upon transportation, upon the holders of railway bonds and upon the salaries of railway employees, and savings by transportation given gratuitously or at reduced rates on government account, represented governmental receipts estimated at over $20,000,000 annually. To meet its obligations in connection with the railroads the government had been forced to resort to financial operations which occasioned severe loss. For example, one issue of securities of a face value of $200,000,000 brought into the treasury less than $126,000,000.

The situation was going from bad to worse. Although the concessionary companies had paid dividends ranging from three to seven per cent, they had been able to do this more by the aid of the government than by their earnings. The companies were not satisfied with this state of affairs, nor was the government. The expenses of the supplementary lines exceeded their receipts. Growing dissatisfaction among the employees reached a climax

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in the strike of 1902, which was only brought to an end by governmental intervention and by governmental assumption of the burden imposed by the easier conditions which it seemed advisable to grant. By 1905, 15,264 kilometers were in operation. The 12,465 kilometers built by the state had cost—plant, structures and equipment—5,188,476,381 lire, that is, an average of about $134,000 a mile.

Proposals were made for a readjustment of the relations between the operating companies and the government; and it is not improbable that satisfactory arrangements might have been worked out, had not some of the concessions for operation expired in 1905, when the general feeling of the people and the attitude of the government in power was in favor of state operation. There was no time for thorough deliberation. The measures taken were those that seemed on their face expedient.

Governmental resumption of leased lines

On April 22, 1905, a law was passed providing for the resumption by the government of the lines of the Mediterranean, Adriatic and Sicilian companies and of certain minor lines. This law decreed a provisional organization to take effect July 1, 1905. On July 7, 1907, was enacted the law for the organization of state operation of the railways not granted to private corporations. Its provisions are substantially in effect at the present time. It provides that, when concessions have expired lines may be taken over by the state by royal decree, upon ad-

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vice of the Council of Ministers and with the approval of Parliament. In other cases the assumption of state operation or the extension of corporate operation has to be authorized by special enactment.

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CHAPTER IV

RAILWAY PASSENGER TARIFFS

Effect of social distinctions in Europe

EUROPE has inherited from the feudal period sharp distinctions between social strata. At the present time these are perhaps not so well defined as in former generations; yet it was doubtless such divisions as those which exist between the nobility, the tradesmen and the peasants, rather than a desire to adjust fares to the purses of the different kinds of travelers, that caused, at least primarily, the provision by the railroads of first-, second- and third-class accommodations for passengers. This supposition is measurably borne out by the fact that the provision of first-, second- and third-class compartments in the tram cars is general in many of the cities. In Brussels, the middle compartment of the tram car was originally reserved for those paying first-class fares. The number of other passengers, however, was so much greater as to weigh down the end compartments, the larger middle compartment being scantily patronized. Thereupon the preferable middle compartment was made second class, and first-class passengers were assigned to the end compartments previously allotted to pas-

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sengers of the second class. It is quite true, however, that the traveling of the poorly paid wage-earners would be far more restricted were it not for the third-class fares.

In the United States, whose government was based upon the hypothesis that all men are free and equal, second-class tickets were formerly sold for the transportation of emigrants, and they are still sold for long journeys in the West. It has never been the practice to provide first-, second- and third-class accommodations on every train, and such a practice would hardly be tolerated, although the population is now less homogeneous and class distinctions are more pronounced than when the government was founded. The provision of sleeping and parlor cars, it is true, effects a distinction in fact if not in name; but these are commonly used only for journeys of considerable length; in local and suburban travel all sorts of passengers use the same coaches. In our city car lines no distinction has appeared. Separate accommodation for whites and blacks in the Southern States is not associated with any difference in the fares.

Class accommodations in Europe

The accommodations provided for first- and second-class passengers on the European railways are, as a rule, almost identical; a principal difference seems to be in the color of the upholstery; usually, however, there are fewer seats in the first-class carriages, so that the traveler has more elbow-room. The accommodations for third-class passengers are

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sometimes nearly as good as those for second class, but generally they are much worse, so deficient in ordinary comfort that they would not be tolerated in the United States by any person able to buy a railway ticket. On the early morning and late evening trains that carry workingmen into and out of the large cities, the third-class cars have hard wooden benches upon which their occupants may be seen huddling together, each passenger supporting the person next to him as they smoke and sleep in the stifling atmosphere. There is no such rude equipment in the United States, not even in the trains in the mining and lumbering regions.

Passenger tariffs in Germany,

The passenger tariffs are of three kinds: First, the strict distance tariff, as in Germany, under which the fare is so many pfennigs for each class for each kilometer traveled; second, the tapering tariff, as in Italy, under which the charge per kilometer decreases with the distance traveled; and third, the zone system, a tapering tariff under which the rates are the same to all stations within a particular zone, radically decreasing to the stations in the next zone. For suburban travel, commutation tickets are sold at reduced rates, as in the United States. Especial round-trip tickets are sold for workingmen. Reduced rates are usually made for Sunday tickets. Reductions for a considerable number of passengers traveling together are more restricted than in the United States.

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It is not believed that any one who has traveled extensively both in the United States and in Europe will hesitate to say that the passenger accommodations of even the most advanced railways and between the principal cities of continental Europe are on the average far inferior to those which are usually furnished in the United States. On local trains and in the backward regions the passenger service is an abomination.

The passenger tariffs in Germany are upon a fixed kilometric basis for each of the four classes, and an extra charge is made for passage on express trains. Hand baggage only is carried free. A fee, varying with weight and distance, is charged for all that is forwarded in the baggage cars. Return tickets were formerly sold at a reduction from the price of two one-way tickets, but within recent years return tickets have been done away with, and the one-way fare has been made half the old round-trip rate. At the same time the additional payment previously exacted for a seat on an express train was abolished. A few months prior to this readjustment the Imperial Government imposed a tax upon all tickets, ranging from as low as two per cent on tickets of the third class to as high as 16 per cent on long-distance tickets of the first class. This tax is collected by the railways and paid into the imperial treasury. The charge upon all except hand baggage was introduced to make uniform the practice in the different states, in some of which

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there had been a certain allowance of free baggage and in others varying scales of charges. The general result of these changes has been to make travel of the higher classes dearer than before. Many passengers are, therefore, traveling in a lower class than formerly. This change of habit affected the receipts from the ticket tax, which in 1906 were $3,250,000 less than estimated.

It will be perceived that a traveler by rail in Germany pays, first, the ticket rate; second, an extra charge for use of an express train; third, a ticket tax; and fourth, a fee for the registering of baggage not carried in hand.

in Belgium,

In Belgium there is an extraordinary arrangement under which a person can buy a ticket allowing him to travel at will over the entire Belgian railway system for a period of 15 days. The price of such a ticket is 61.50 francs for the first class, 41 francs for the second and 23.50 francs for the third. This concession brought an outcry from the poorer classes, who said that they had but a short holiday each year and should be granted a corresponding concession of which they could avail themselves. This protest led the government to concede, at one-half of the above rates, tickets which give the purchaser the run of the entire Belgian railway system for a period of five days.

in Switzerland

When the Swiss government took over the railways it made a readjustment of passenger rates, in which it practically adopted as a general sched-

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ule the lowest schedule previously in force. It retained the provision for three classes of passengers on ordinary express trains, but announced that on fast express trains provision for third-class, and, if necessary, for second-class, passengers might be dispensed with, and that on local trains there need be provision for third class only. It was specified that at least three trains a day should be run in each direction over the entire length of each line, stopping at every station, and that additional accommodation should be provided where necessary. A charge is made for all baggage except that carried by hand and not exceeding 22 pounds in weight. Commercial products or utensils for the use of the passenger are carried free up to the weight of 55 pounds. This is evidently a concession to the poorer people and to the workmen who carry products made in their homes to the place of sale.

Zone systems

In many places in Austria and in Hungary the passenger tariffs are based on the zone system. This was first introduced in Hungary in 1889 for the express purpose of building up the capital at Budapest, the tapering scale applying from any interior station to Budapest, but not from any interior station to any other interior station by way of Budapest. The object was to induce people of the interior of Hungary to visit the capital with frequency and to make purchases there. To a considerable degree, undoubtedly, this object has been at-

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tained; but the device has had a disastrous effect upon the revenues of the railways; and the state, which operates most of the railways, has sought to increase their receipts by the imposition of a transportation tax on passengers and on luggage which amounts to 18 per cent of the transportation charge. On certain lines, both in Austria and in Hungary, the payment of a fixed charge for a certificate known as a "*Legitimation*" enables the holder thereafter to purchase tickets at half the ordinary fares.

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CHAPTER V

RAILWAY FREIGHT TARIFFS

Quick and ordinary service rates

On the old-time post roads of continental Europe a higher charge was made for merchandise carried by quick post than for that carried by ordinary post. The railways have perpetuated this distinction, embodying in their tariffs quick service and ordinary service rates, a differentiation unknown in the freight tariffs of the United States. Here certain rates imply and include quicker than ordinary service for certain commodities, such as livestock, vegetables and fruits; but there are not two sets of charges for the transportation of the same commodity at different rates of speed. In Europe the quick service is comparatively little used. The merchandise consigned at the higher rate is ordinarily goods of the more valuable kinds in small shipments, or larger shipments for which an exceptional occasion may demand rapid transportation. The function of quick service for small shipments is performed in the United States by the express companies, which came into existence at a time when the railroads for the most part were comparatively short local lines and it was not the general custom

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to run freight cars through from one road over another. The speedy transportation of valuable merchandise on passenger trains over both short and long distances was then, as it is now, a desideratum. For such service on passenger trains the European railroads charge two and four times the ordinary freight rate.

Growth of the tariffs:

In the early period during which the railroads of continental Europe were operated in large measure by private corporations, freight charges developed in much the same way and awakened much the same protests as in the United States. Tariffs were adjusted to meet commercial conditions: that is, rates were made to secure traffic. This brought about the same discriminations that have been the source of bitter complaint in the United States. Lower rates were charged for the long haul than for the short haul; lower rates were accorded to larger shippers than to small shippers; rates varied for different commodities and under the influence of various considerations. The railways were so successful in competition with the interior waterways that there arose the cry that these creations of man were throttling the waterways, which were held to be the naturally ordained channels of transportation.

This does not imply lack of a basis for the original railway tariffs, but rather that adopted schedules were departed from under stress, as in the United States. It is perhaps a safe conjecture that not only the distinction between rates for quick

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service and ordinary service but the early classifications in general were, as in the United States, an inheritance of the practices of the carriers over the land roads, and that, as in the United States, classifications became more complex and rates differentiated as traffic increased in variety and volume. That each shipment should bear a terminal charge—*i.e.* a charge for the handling in stations—is generally recognized in the countries of continental Europe by the inclusion in the tariffs of such a "terminal" or "despatch" charge, which is separate from and in addition to the rate specified for transportation.

in Switzerland

In Switzerland the earliest tariffs were based upon the weight of shipments and the space which they occupied. Modifications were subsequently made according to the value of the goods. Because of the short distance traversed by the Swiss railways, an elaborate classification of freights has not even yet been necessary. The dissatisfaction with the different schedules adopted by the different railroads led to a reform of the tariffs by the government in 1882. The general framework then adopted was retained in the Act of June 27, 1901, and is similar to the underlying freight-rate structure of the other countries of continental Europe. The tariffs are at a fixed rate per kilometer, but are subject to increase on the lines ascending mountains, and especial tolls are levied for transport over bridges and through tunnels. Reductions are made on bulk

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goods in transit traffic—*i.e.* traffic that crosses Switzerland on its way from one country to another. Each tariff provides for a terminal charge, which is graded, and for a transportation charge, which is at a fixed rate per kilometer.

Character of Swiss commerce

That a simple freight-rate structure suffices for the needs of the commerce of this country is made evident by even a superficial consideration of what constitutes that commerce. Although its area of 15,972 square miles is but half of that of the State of Maine, and 70 per cent of this area is mountainous, Switzerland has maintained not only national independence, but a creditable position in the industry and commerce of the world. The soil produces sufficient food for the needs of only two-thirds of the population, which is about 3,500,000. Yet, although the country is obliged to import much grain and meat, it is a large exporter of certain foodstuffs, mainly the products of milk. With the exception of limestone, largely used for building, the mountains have little mineral or ore of economic importance, yet in the manufacture of metal goods Switzerland has a world-wide fame. The same is true of her weavings of silk and of cotton. The abundant water power that was long ago directly utilized now serves to generate electricity, and for the use of this form of power a wider field is hoped, even to the extent of the complete electrification of the railways. At the present time, however, the Swiss factories are dependent mainly upon steam

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generated by coal, which must be imported from other countries. Under these conditions it is evident that Switzerland cannot compete with other nations in the bulkier and heavier manufactures. The efforts of her workingmen must perforce be devoted to the fabrication of the lighter and more delicate articles, to the value of which skill and excellence of workmanship contribute in the greatest degree and crude material in the least. Conforming to this economic necessity, the high intelligence and patient perseverance of the Swiss people have developed a skill in handiwork which has augmented with every generation, and an adaptability that has enabled them to make prompt and deft use of the elaborate machinery devised for the watchmaking, the cotton, silk and leather industries.

The tapering tariff of Belgium

Belgium was the first country in Europe to adopt generally the tapering tariff, which succeeded the fixed kilometric or exact distance tariff in 1860. The theoretical basis for the tapering tariff is found in the consideration that every shipment of freight—for example, every 100 pounds—should contribute to the fixed expenses of a railroad, whether the shipment be carried a short or a long distance, and that the charge for this contribution to fixed expenses can properly be graded over a comparatively short distance, leaving the charge for the remainder of a longer haul to be adjusted somewhat in proportion to the running expenses. It is evident that this adjustment tends to encour-

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age the longer distance traffic. It promptly exhibited this tendency in Belgium, and the success of the tapering tariff in that country has stimulated its introduction in other countries.

Belgian classification

The Belgian freight classification, although more elaborate than that of Switzerland, is simple compared to the classifications of other countries with a more varied traffic. It has endured for more than 30 years.

Tariff No. 1 is for the light-package freight, carried usually on passenger trains. This corresponds to the express traffic of the United States.

Tariff No. 2 (quick service) is for shipments not exceeding 200 kilograms (440 pounds). Packages weighing up to 60 kilograms (132 pounds) and prepaid by means of railway stamps, are transported from one point to another in the kingdom at rates varying from 0.50 francs to 1.10 francs, according to the weight; those that are not prepaid are subjected to charges varying from 0.70 francs to 1.30 francs. Shipments weighing from 60 kilograms to 200 kilograms pay according to weight and distance.

Tariff No. 3 (ordinary service) is applicable to heavy goods shipped by ordinary goods trains. Four classes are distinguished. The first class comprises shipments above 200 kilograms and under a carload, as well as carload shipments of merchandise assigned to this class in the table of classifications, such as copper boilers, printing type, furniture, tin-

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ware and machinery. The second class contains, notably, polished iron and old machinery. The third class includes, notably, iron in bars, beaten, laminated or drawn but not polished. The fourth class embraces cast-iron, coal, rough stone, bricks, fertilizers, etc. Under this class of tariff No. 3 is moved the great bulk of the freight.

Tariff No. 4 includes gold and silver, coin and bullion, which is moved at rates that vary with the value of the shipments.

Tariff No. 5 includes shipments of horses and cattle, which are charged either per head or per carload.

Tariff No. 6 includes the ordinary road vehicles, carriages and wagons.

The railroad employees load and unload shipments under tariffs Nos. 1, 2 and 3 amounting to less than a carload. For shipments under tariffs Nos. 1 and 2, the costs of handling are included in the rate. For merchandise included in tariff No. 3, less than carload shipments, a charge of 0.10 francs per 100 kilograms is made for loading and unloading. Shipments of the other classes are loaded and unloaded by the shippers and the receivers.

For the local and the mixed Belgian traffic there exist numerous special tariffs, and there are also exceptional tariffs applicable to raw products of great necessity, such as coal, minerals, stone, castings, fertilizers, agricultural products, etc. Special

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tariffs apply, furthermore, to import and export traffic that moves in full carloads. For example, special rates are made on coal from the Liège district, which is contiguous to Germany, in order that it may move out through the Belgian port of Antwerp instead of going by the shorter route through Germany to the sea.

The framework of the Belgian tariffs is here set forth in some detail, because these tariffs have been held up as models of simplicity, which the railroad managers of the United States would do well to emulate. The attention of the Belgian tariff makers might with equal propriety be called to a still simpler system of transportation rates: namely, that of the old-time wagoners, who charged so much per cubic foot for articles light in weight and so much per 100 pounds for articles heavy in weight per 20 miles. It is not a serious exaggeration to say that the variety and complexity of the traffic of Belgium and the resultant need of a complicated rate structure no more exceed those of the days of the old road wagons than the complexity of this entire problem in the United States exceeds that of the problem which the Belgians have had to solve.

The area of Belgium is 11,373 square miles, about equal to that of the State of Maryland. The population in 1831 was 3,785,814; in 1907, 7,317,561. The country does not produce enough of foodstuffs to supply its people, or of raw

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Commerce of Belgium

material for its manufactures; and of these manufactures the major portion must find a market in other countries. To but a small extent does the traffic of Belgium with other countries move by rail; the food supplies and the raw material come in and the manufactured products go out through the one port of Antwerp. In this port, therefore, the avenues of transportation are focused, both the waterways and the railways. Grain from Russia and America come in through Antwerp; grain from Hungary is loaded at Trieste on vessels which bring it to Antwerp. Cotton and other materials from America, as well as certain machinery and other merchandise from England, America and other countries, are imported through Antwerp; and through this port the laces and other fabrics, the glass, pottery, rifle-barrels and machinery of Belgian manufacture go out.

The coal fields of Belgium are in the south, where have arisen the manufacturing towns of Charleroi and Mons, and in the southeast, where is the manufacturing center of Liège. The heavy products of Belgium come from these three centers; for Brussels, Ghent and other manufacturing centers produce for export laces, gloves and kindred products that are high in value but light in weight. At Verviers, wool imported from England and from Australia and cotton from America are woven into cloth, which is exported to England and in lesser quantities to America. The manufactures of the

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other cities of Belgium are furniture and the simpler articles of general use which are sold in the local markets.

The transportation problem in Belgium

From the geographical configuration, the political boundaries and the industrial characteristics of Belgium, it results that a transportation system adapted to the needs of this country must provide for the conveyance of raw material from Antwerp to the places of manufacture; and of manufactured products from these places to Antwerp for export; of coal from the mines to the manufacturing centers and throughout the kingdom for general consumption; and likewise of cement, brick, wood and similar materials from place to place within the kingdom. The traffic in the higher grades of merchandise between place and place in Belgium is small. Not only are the people as a whole exceedingly industrious, but the old-time self-sufficiency of the locality and even of the household is preserved to a greater degree than in almost any other of the countries of modern civilization. Local tailors make the clothing for the men; the women the clothing for themselves and their children. The households in the smaller towns and in the rural districts raise their own truck in their small gardens; the larger towns and cities are supplied by truck farmers, who bring to the markets by hand-cart, by donkey-cart, by wagon or by tram-car the produce from within a limited radius. In the smaller towns and in the country the lower classes eat but little meat. Brus-

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sels and the larger cities are well supplied with fish brought by quick train service from the North Sea. There is, however, a limited movement into Belgium of fruits and vegetables from France and from northern Italy.

Tariffs of France

In France the maximum rates to be charged for passengers and for goods were specified in the concessions originally granted for the nine main lines of railway in 1842. Even at that early date four classes of freight were distinguished. In proportion as the tariffs were adjusted to stimulate traffic, the railways in some cases competing with and taking traffic from the waterways, the rates actually charged rapidly fell below the maxima. The different lines being operated by different companies, there was some attempt to extend the markets of places of production on one line in competition with places of production on other lines. Thus arose inequality of rates, different prices being charged in different places for carrying the same commodity over the same distance. This led to popular complaint, which became louder as discrimination increased. When the government assumed far-reaching control over the operations of the railways, there appeared a tendency, which has continued, to make the tariffs uniform. Among the influences making for uniformity was the fact that the members of the Chamber of Deputies found it difficult to discuss railway tariffs of the variety and complexity which result from adjustment to

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commercial needs. It is much easier to talk about a tariff on a simple distance or a tapering basis.

The freight tariffs distinguish between accelerated transportation (*grande vitesse*) and ordinary transportation (*petite vitesse*). For the former there are two classes—the one comprising general merchandise for which quick shipment is desired; the other, perishable foodstuffs, such as vegetables, fruits and milk. These tariffs are upon a kilometric tapering basis, which does not allow foodstuffs to be brought from very far. Even in Paris milk comes from within a limited radius and is very expensive. The *petite vitesse,* designated by du Maurier in "Trilby" as the "little quickness," which includes all goods carried as ordinary freight, recognizes six classes. Perhaps 90 per cent of this freight is carried under tariffs that have come down from the older competitive régime and are nominally "exceptional," but in nearly all instances these tariffs have been so modified that they are likewise upon a tapering kilometric basis, which applies from any place of shipment in the country. The entire tendency is to stereotype the French freight rates into a rigidity from which there is little departure and which keeps them in general at a level higher than in the United States, although certain rates for short distances may be lower. Special reductions in railway rates apply to much of the export traffic. Such reductions were formerly made upon import

The tapering kilometric basis

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traffic also, but these have been gradually discontinued.

Traffic of France

The manufactures of France that find export markets are mainly products *de luxe*—laces, textiles, ceramics and other articles that are high in value in proportion to their bulk and weight, the full load of a 10-ton car comprising an output that represents long labor of skilled artisans and correspondingly high cost.

But little food is brought from great distances. The farms of France have so greatly increased their production in recent years that the country is obliged to import but little grain. In accordance with ancient custom, the grain of local production is for the most part ground into wheat at neighboring mills for local consumption. In recent years larger mills have been established, but even these do not make flour in sufficient amounts to be marketed beyond the confines of the department. Very large mills in the vicinity of Paris produce the flour used in that city. Vastly the greater proportion of the eggs, poultry and garden produce consumed even in this great city is brought by farmers in wagons, which they may have driven for the greater part of the previous day and night in order to display their merchandise on the following morning at one or another of the city markets.

Similarly, little meat is brought from great distances. Livestock is sent by rail to the abattoirs of the various towns, where it is killed for local

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consumption. The manager of one of the railway companies endeavored to effect a greater centralization in this respect, but his efforts were unsuccessful. The single towns levy the *octroi*, a town tax, upon the local abattoirs, and not one of them was willing to suffer the loss of revenue that would result if its inhabitants were to obtain their meat from a large abattoir in another town.

The average amount received by the French railways in 1905 was equivalent to almost one and one-half cents per net ton per English mile. Up to 1904 the nation and the departments had contributed under guaranties, and as subsidies to the six great companies, $926,350,000, which at four per cent amounts to an annual charge to the state of $37,054,000. This is equivalent to a charge of 3.7 mills per ton mile, which added to the average paid by the shippers makes the charge on the rail freight traffic borne by the people of France average about 1.8 cents per ton mile. This is more than double the average in the United States.

Prussian tariff scheme

When the Prussian-German government took over the railways, the tariffs were remodeled, in accordance with popular desire, upon the basis of what was then generally accepted as the "natural system," that is, the cost of service. It was held, at the time, that it was not part of the function of a railroad to adjust its tariffs to market conditions. It was quickly found, however, that cost of service, as applied to any particular shipment, was a chimera,

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and that the rigidity of these rule-of-thumb tariffs was not only restricting the traffic of the railroads, but hindering commerce. So many exceptions were made to the tariffs that before long they had apparently relapsed into the condition that during the preceding period had been characterized as chaotic. This led to a further revision and to the adoption of the present system, which is a compromise between a strict distance tariff and a tariff to meet commercial needs.

The general tariff scheme of Prussia falls into two divisions. The first includes all piece goods—*i.e.* all merchandise in lots of less than five tons, which is the minimum upon which a carload rate is granted; the second includes carloads of five and 10 tons. The first division has four classes: the first includes piece goods in general, forwarded by fast service and paying the highest rate, which is upon a tapering basis up to 500 kilometers, or 310 miles, and upon a fixed kilometric basis beyond; the second includes certain perishable foodstuffs, plants, etc., whether they move in less than carloads or in carloads, an exception being made in this instance to the rule applying to the division; the third includes merchandise in general in less than carload lots. The tariff for the second and third classes is exactly the same, being one-half that of the first class: *i.e.* it is on a tapering basis at one-half of the specified first-class rate up to 500 kilometers and upon a fixed kilometric basis again at one-half of the first-class

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rate for greater distances. Shipments of the second class, however, have the fast service, while those of the third class have the ordinary or slow service. The fourth class comprises certain exceptions to the third class, mainly heavy and staple goods, which are carried at a fixed rate per kilometer up to 726 kilometers, or 450 miles, and at a lower fixed rate per kilometer for greater distances. Up to 300 kilometers this fourth-class rate is less than that applied to the third class; from 300 to 400 kilometers it is the same; from 400 to 726 kilometers it is higher; and for greater distances it is the same. The first division may be summarized as composed of (1) general fast piece goods, (2) specified fast piece goods, (3) general slow piece goods, (4) specified slow piece goods.

The second division is composed of class A1, covering five-ton shipments of general merchandise at a fixed rate of 6.7 pfennigs per ton per kilometer; class B, covering 10-ton shipments of general merchandise at a fixed rate of six pfennigs per ton per kilometer; classes I and II, covering 10-ton shipments of certain heavy or staple merchandise at fixed rates per ton per kilometer of 4.5 and 3.5 pfennigs respectively; class A2, covering five-ton shipments, at a fixed rate of five pfennigs per ton per kilometer, of such articles as are designated in classes I and II; and class III, which covers 10-ton shipments of designated merchandise. In this last class the rate is 2.6 pfennigs per ton per kilo-

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meter up to 100 kilometers and 2.2 pfennigs for greater distances.

There is an express tariff, covering shipments which take precedence of the fast goods: the rate is double the ordinary fast-goods rate for piece goods and four times the ordinary carload rate for carload shipments. The parcels post provides for the shipment of parcels up to 50 kilograms or 110 pounds in weight.

For all shipments by freight, of whatever kind or class, there is, in addition to the transportation charge above indicated, a terminal charge, which varies with the distance over which the shipment is to be carried.

Ausnahme or commodity tariffs

Comparatively simple or comparatively complex as this general tariff scheme may appear, according to the point of view from which it is regarded, it has not been adequate to meet the needs of the German rail traffic. Exceptional (*Ausnahme*) tariffs, corresponding broadly to what in the United States are known as "commodity" tariffs, have been adopted to protect the German ports in competition with those of other nations—particularly to secure traffic through Bremen and Hamburg in competition with Rotterdam and Antwerp,—to enable the German manufacturers to hold their own in foreign markets and, in a general way, to develop industry. There are 25 of these exceptional tariffs applicable to so many commodities—fuels, ores, wood, oils and other raw materials, as well as iron

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and steel articles—that they cover from 60 to 70 per cent of the freight traffic of Germany. Upon export traffic, and upon much of the import traffic, far lower rates are made than upon local traffic; and lower rates are made also upon much of the traffic that crosses Germany, passing from one foreign nation to another. In spite of all these exceptions, prominent business men of Germany affirm that the railway freight rates are not shaped by the needs of industry and commerce; that, on the contrary, industry and commerce are obliged to adjust themselves to the freight rates. This judgment finds substantiation in the fact that the exceptional tariffs do not, as a rule, apply to finished products in the interior or intra-national traffic, and that there is comparatively little flexibility in the general tariff scheme. There do not exist in Germany such concessions as milling in transit and reconsignment, privileges which the railroads of the United States have extended beyond reason.

German commerce:

The kilometric basis of freight rates requires no modification as regards the distribution of finished iron and steel products throughout the empire, for the great iron and steel plants are all located in the lower Rhine district, and the question of equalizing charges for different competing centers does not exist. In the way of imports stands a heavy protective customs tariff. Upon the raw materials used in the making of iron and upon the crude iron prod-

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ucts, however, the manufacturers of different districts have sought and obtained concessions in rates that serve a purpose similar to that attained in the United States, where the railways have so adjusted their rates that the furnaces of different districts may obtain the raw materials that combine to make a ton of pig-iron at approximately the same total transportation charge.

grain and grain products,

The imported grain and grain products that come through the northern ports are distributed throughout the manufacturing districts without much competition other than that of the farms in southern Germany and that of the agrarian eastern provinces. The farm products of western and southern Germany are, for the most part, consumed in the districts in which they are grown; but the surplus grain from the east finds its markets in the west to the limit of production. Here again, accordingly, the kilometric basis of rates is practicable: it requires no modification by reason of the competition of different grain-producing regions. At times, nevertheless, different districts have sought readjustment of rates in their respective interests. In 1891 reduction was made in the grain rates from eastern Prussia to the Rhine provinces; but the farmers and millers of the western German states brought such vigorous opposition to bear in the Reichstag and the Bundesrath that the reduction was annulled. Grain and flour once moved at the same rates; but upon complaint of the smaller mill-

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ers that they were at a disadvantage, because of the waste of grain in the milling, flour was advanced to a higher class. Exceptional tariffs govern the transportation of fertilizers.

dressed meats,

Beef from North and South America, hams and other pork products come in through the North Sea ports and are readily distributed on a kilometric basis. Their market is, however, principally in the manufacturing districts, the people of the interior using little meat other than that grown on the farms and killed in local slaughter-houses.

livestock,

Livestock moves from the country to the larger cities, where it is killed and used for local consumption, there being no great outbound movement of dressed meat as in the United States. Exceptional tariffs, however, are made for breeding animals and for animals carried to grazing grounds. Poultry, principally geese, come largely from Russia and readily move on the kilometric basis, being marketed without other competition than that of the geese grown by the German peasants, which find a ready sale.

fruits,

Nearly all the fruits and vegetables used in Germany are grown near the places of consumption. Of late years, however, there has been an increasing importation of vegetables from Holland, where the alluvial lands are particularly adapted for their growth, and from France. From France come also peaches and artichokes, but these are still luxuries, consumed principally in the great centers of popu-

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lation and in the manufacturing districts. Oranges are imported from Italy and are more widely distributed year by year, even in the smaller towns, where, although the standard of living is far below that of the great centers and of the manufacturing districts, the variety of food consumed by even the lower strata of the population has notably increased in the last 20 years.

lumber,

The forests of Germany are carefully and scientifically conserved. The governments of most of the states long ago decreed that for each tree cut down on public lands a new tree must be planted. The owners of private forests have followed this custom, and it is these replanted forests that now supply the lumber of local production, which is largely used for props in the mines. Wood is not largely used in the construction of buildings; these are ordinarily made of stones, brick and concrete. The lumber of which furniture is made comes into Germany through the Baltic ports and the North Sea ports; the logs are conveyed by water to Berlin, Magdeburg, Cologne, Frankfort and other cities, where furniture is made; and the furniture is distributed throughout the area tributary to each place of manufacture. In this instance, again, there is no occasion to adjust railroad rates in order that competing manufacturers may meet on equal terms in the same markets. The same is true of the manufacture of cotton goods: the cotton comes in through the North Sea ports and goes to the mills

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or Saxony and the east as well as to those of the west.

coal

There are coal fields in the southeast as well as in the west and southwest; but, as they are practically equidistant from Berlin and other great coal-consuming centers, there is no necessity for any particular adjustment of coal rates to enable competing mines to sell their products in the same markets. In the past, the operators of different coal fields have endeavored to obtain concessions in order to extend their markets, but their applications have been refused. A reduction from the normal basis is, nevertheless, made on coal from the Westphalian mines to the North Sea lowlands and on coal from the Silesian fields to Berlin, Danzig and the Baltic *Hinterland,* in order that it may there compete with sea-borne coal from England. At many places reduced rates are made for coal moving in trainloads.

German and U. S. systems

A comparison of the freight-rate system of Germany with that of the United States with its percentage systems, basing points, fixed differences, common points, group rates and differentials, discloses radical points of difference. To say that the modification of its system by either country along the lines of the other would inure to the advantage of its industry and commerce would be to make a dangerously broad statement. Such an assertion would be of no value unless fortified by a thorough analysis. It is safe to say, however, that

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the freight classifications of Germany are not so pliant as those of the United States, and the German officials admit that on the whole their freight rates are higher.

Lack of distributing centers

The German system of freight rates has one effect, which has been indicated already, but which merits further consideration. It prevents the growth of distributing centers in the interior of the empire, making the seaports and the manufacturing centers the sources whence, as a rule, supplies are shipped directly to the retail dealer at the place of consumption. In a country where the greatest continuous rail distance is less than a thousand miles, and where, in pursuance of the old-time custom, manufacturing is still carried on in many small towns for local distribution, the German system of rates fairly meets the needs of the existing traffic. It does not impede traffic to the extent that it would in the United States, where a rapidly spreading population, without hindrance from interstate customs duties and without commercial rivalry other than that which springs from a desire to increase production and distribution, has developed a transportation system which permits the materials and products of one region to be carried to markets distant 1000 or 2000 or even 3000 miles. Under this system adequate supplies of goods can be held at distributing centers 200 or 300 miles apart, and from these centers the local dealers can replenish their stock at short notice, being thereby enabled to offer

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to their customers merchandise in variety and quantity unknown to the German interior.

Austria-Hungary tariffs

In both Austria and Hungary the tariffs are complicated, but the system of tapering rates is common to all the railways. The primary tariff scheme is similar, broadly speaking, to that of Germany, but there are many intricacies.

The exceptional (*Ausnahme*) tariffs are susceptible of more liberal application than in Germany. Modifications of the regular rates are made because of "competition between two or more railways with respect to traffic to or from the same district; competition with waterways and landways; competition for the purpose of securing traffic for a special port; competition of several districts of production for one specific district of consumption; to counteract the disadvantages of geographical situation; to assist the agricultural and general industry to secure new markets, with a view to insuring a continuous and increasing traffic."

It would seem clear that this greater liberality in the way of exceptional tariffs is due to the fact that the rail traffic of Austria and of Hungary has been largely developed by private companies. These companies have adjusted their tariffs to meet commercial conditions; and because of the slower development of governmental control, flexible practices have not been transformed into rigid rules to any such extent as in Germany. In Austria and Hungary experimental rates are also accorded, fre-

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quently under agreements to pay rebates on shipments that exceed a certain specified quantity. Special rates are given on traffic for export, but as a rule the ordinary tariff rates apply to import traffic. In Hungary, in addition to the freight charge, there is a transport duty of seven per cent on fast and five per cent on slow freight.

To meet the low rates which the German state railways make to induce traffic from the interior to the Levant to move by way of Hamburg, the Austrian railways make a special reduction to secure the movement of this traffic by way of Trieste.

Tariffs of Russia

From the outset the Russian government prescribed maximum rates for passengers, for livestock and for freight in general. From the first there were tariffs for fast freight and for slow freight. The latter was of three classes: the first included metal wares, cotton and woolen goods, wine, tea, coffee, sugar and other high-class merchandise; the second covered principally the raw materials of manufacture; the third comprised foodstuffs, wood, stone, coal and so forth.

The railways soon carried freights at less than the maximum rates, adjusting their tariffs to their own profit and making, under the pressure of competition, the same discriminations between shippers and between localities that were made under similar conditions in the United States. There was bitter complaint on the part of shippers; and the govern-

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ment suffered because the loss of revenue to the fighting companies compelled it, under its guaranty, to furnish large amounts for the payment of interest. Various laws passed between 1880 and 1886 endeavored, but without success, to bring about an equitable and orderly status. In 1889 a new law was passed, establishing special departments in the Ministry of Finance for the reform and subsequent direction of all matters pertaining to the tariffs. This law is still in effect.

To do away with unrestrained competition between rival lines, the government made regulations distributing the traffic between such lines and adjusting the division of through rates. New tariffs were finally established for the different railways, providing for fixed terminal charges for the different classes and for progressively lowering—that is, tapering—charges for transportation. The practice of making lower charges on import freight, which tended to nullify the protective customs tariff, was prohibited.

It was soon found that exceptional rates must be made for the great staple products, if they were to find any extended markets. Special rates were, therefore, made upon grain, salt, coal, lumber, kerosene and naphtha, flax, hemp, sugar and livestock. In the succeeding years the number of exceptional rates was greatly increased to enable particular commodities to find a market. Very low rates have been made on long-distance traffic, especially on that

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destined to Siberia. As a market for manufactures, the relation of Siberia to European Russia is analogous to the relation of the region west of the Missouri River to the eastern and middle districts of the United States. Especially low rates have been made on export products, that the products of one region may compete with those of another in common markets.

It will be seen that the modification of the Russian tariffs has been similar to that of the German tariffs. In both countries the rates made by the railways under the régime of free competition, aroused discontent; in both countries the governments then endeavored to bring the tariffs under a mathematical formula; in both countries it was soon found that numerous exceptions must be made in the interest of industry and commerce. In Russia as in Germany these exceptions have become very numerous and very important. While their main purpose has been to build up traffic to and from the port of St. Petersburg and to develop traffic with Siberia, they have also in large measure tended to foster traffic between one place and another in European Russia.

Complexity of Italian tariffs

In Italy the different régimes under which the railways have been conducted have given to the freight tariffs a complexity with whose intricacies few even of the railway officials are familiar. The underlying scheme perhaps resembles more nearly that of Belgium than that of any other country.

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The simplification of the tariffs is one of the tasks that confront the Railway Administration.

As the needs of the Italian population are simple, their consuming capacity is low. Because of this and of the fact that the self-sufficiency of the community has prevailed throughout this country as elsewhere in Europe, the development of interior traffic has been slow. Imports and exports come and go through the seaports, of which there are so many that long hauls by rail are exceptional. The development of manufacturing in northern Italy and the increased production of fruits and vegetables as well as of wines in the south are, however, bringing a change in this respect: the sending of the products of the southern farms and vineyards to the north and of the manufactures of the north to the south is creating a reciprocal flow of traffic.

The bulk of the shipments, however, is greater from the south to the north, a large proportion of the cars sent north returning empty. To encourage the marketing of fruits, vegetables and wines in the northern countries of Europe, the Italian railroads have made especially low rates on such shipments, which are now generally carried in through cars to the places of destination.

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CHAPTER VI

CONCERNING FREIGHT TRAFFIC

Terminal charges

REFERENCE to a freight tariff of Germany, Belgium, Austria or certain other countries of continental Europe shows that every consignment must pay first a "despatch" or "terminal" charge, such as is practically unknown in the United States, and secondly, a transportation charge; but this is not all. Whether it owns the railroads or not, the hand of the government reaches into the transaction. The practices of the various countries differ in many respects, but those of Germany may be taken as generally typical.

In Germany, piece goods—that is, goods in packages—are loaded and unloaded by the railway company and are generally forwarded in closed cars. Other goods must be loaded and unloaded at the cost of the shipper or the consignee. If the railway, at the request of the shipper or consignee, undertakes the loading or unloading, the charge for either service is about half a cent a hundred pounds, with an extra charge for cranage if the use of a crane is necessary. Carload consignments are usually placed in open cars. If a shipment is of such nature that it requires to be covered, the shipper

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may hire sheets from the railroad for that purpose, and for such rentals there is an elaborate tariff, the charge for covering a considerable shipment over a moderate distance being an appreciable item. If a shipper is not satisfied with the weight declared by the railway, he can have the shipment reweighed upon payment of a fee. For each notice of the arrival of a shipment, the consignee must pay. The railway also charges a fee for counting the number of packages in a carload shipment. The shipper not only has to pay a stamp tax on each waybill, but must also pay for having it filled in.

The "*spediteur*"

In another and important respect the European shipper is at a disadvantage in comparison with the American. The railroads do not provide any such assistance as is furnished by the traffic solicitor, who is a useful if expensive adjunct to the railroads of the United States. Since rebates, cutting of rates and other stealthy devices for securing traffic have been prohibited in the United States, the principal function of freight solicitors is to place their detailed knowledge of transportation at the service of shippers, to figure out routes and rates and to attend to a hundred and one details in their behalf. These are services which need to be performed in any country where agriculture, industry and commerce give rise to a considerable traffic. Notwithstanding the apparent simplicity of their foundation, the complex superstructure of the European tariffs is full of intricacies. To find the way through them

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and to trace out the most direct and least expensive routes, demand expert knowledge and specialized attention. The very largest establishments have special employees for this purpose, but, in general, such services are performed by "*spediteurs*," who are found in every city and in almost every considerable town of the leading European countries. The shipper who avails himself of their services pays their fee, which accordingly forms an addition to the transportation charge made by the carrier. The *spediteurs* also undertake the hauling of merchandise to and from the railway station and perform other functions of the forwarding agent in certain American cities. They also hold piece-good consignments from different shippers until a full carload is obtained to one destination, sharing the saving with the shippers. This "lumping" of shipments is a practice not generally permitted in the United States, the railroad companies declining to allow middlemen to profit at their expense by obtaining the less-than-carload rate through such manipulation.

Trainload rates

In another respect the European railroads are more liberal than those of the United States. In many countries they accord a trainload rate which is even lower per ton than the carload rate. This practice is justified as an extension of the wholesale principle, of which the carload rate is the first manifestation. As the cost of moving a solid carload is less than that of carrying a number of scat-

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tered shipments of the same weight, so also the cost of moving a train of fully loaded cars, containing one commodity from one place of shipment to one destination, is less than that of moving the same number of carloads of heterogeneous contents to different places. The granting of the trainload rate, however, has been forbidden by the Interstate Commission, and its ruling was upheld by the Supreme Court of the United States on the ground of public policy.

Demurrage

In Germany, goods which the consignee has to unload must be removed from the railway station within 12 hours' working time after they have been placed in position. Goods which it is not the consignee's duty to unload, must be removed within 24 hours after he is notified of their arrival. After these periods, demurrage charges accrue and are enforced. At times of extraordinary stress and demand for cars, these unloading periods may be reduced to six hours.

The regulations regarding the packing of goods that need to be packed are so stringent that the railways are practically absolved from liability. The enforcement of a claim against a German railway is attended with such difficulty that it is generally impossible, except by the larger shippers who seek redress in the courts.

In Germany the railways are bound to despatch quick-service freight from the station within one day after receipt and to carry it at the rate of 198

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miles a day. They are bound to despatch ordinary-service freight from the station within two days after receipt and to transport it within one day to a distance not exceeding 66 miles, with a further allowance of one day for each additional 132 miles. In case there is delay for more than 12 hours beyond these requirements, portions of the freight charge are refunded, unless the railways can prove that no loss has been sustained by reason of the delay.

Rates in Europe and U. S.

The great difference in the conditions attending the movement of freight traffic in the United States and in continental Europe makes any specific comparison of freight rates exceedingly difficult. In Germany and in France the rates are admittedly higher than in this country; and it is a fairly safe generalization that the American shipper is better treated, receives better service and relatively more service for his money than the shipper of any country of continental Europe. In times of unusual traffic pressure there are car shortages, delays in movement and various other annoyances in all the Continental countries, just as there are in the United States.

If a comparison is made of the average amount of freight transportation that can be purchased in the United States by the daily or weekly wage of a wage-earner with the amount of transportation that can be purchased in any country of continental Europe by the daily or weekly wage of the corre-

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sponding wage-earner, the situation is undoubtedly vastly in favor of the workmen in the United States, especially if in the European transportation charge the various taxes and *spediteurs'* fees are included.

That the railway traffic of the continental European countries is far less advanced than that of the United States is in no respect more strikingly evidenced than in the difference in equipment. In Europe there are no such powerful locomotives, no such capacious freight cars, no such heavy trains. Freight cars in ordinary use in the United States carry from 40 to 50 tons; those of continental Europe, from 10 to 15 tons.

Capacity of freight cars

One argument advanced for the extension of the German waterways is that the railways, especially those in the valley of the Rhine, have reached the limit of their development. This is an amazing statement to any one familiar with the great American railways, which are laid with rails weighing 100 pounds to the yard, over which pass locomotives weighing 200 tons and more, hauling trains that with their loads weigh in some cases over 7000 tons. In Germany, until within 20 years, most of the freight cars were constructed for loads not exceeding 10 tons. Of the 382,185 freight cars in use in Prussia in 1907, 35.8 per cent have a capacity of 10 tons, 60.7 per cent a capacity of 15 tons and 3.5 per cent a capacity of 20 tons. The larger manufacturers are demanding still larger cars. One of

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the foremost of German manufacturers, when in the United States about 10 years ago, was shown steel cars with a capacity of 40 and 50 tons and was asked why he did not introduce such cars into Germany. Upon his return he put the matter before the then railway minister, urging that the government initiate the use of steel cars with a capacity of 25 or 30 tons, if no more. The minister had formerly been in the employ of the manufacturer, and the relations between them were of such cordiality as to assure sincere utterance. The minister said that only the larger shippers could make use of such large cars, and that to include them in the equipment would therefore give to large shippers an advantage over small shippers, which would of course be a discrimination that could not be tolerated. The minister's point of view was probably determined by the fact that the manufacturers and other shippers of Germany as a rule receive and forward freight in small quantities. This is especially the case in the Prussian interior, not served by waterways, where the prosecution of house industries is still conspicuous and other manufactures are on a small scale.

When this subject was broached in a conversation with an officer of the Ministry of Public Works, he said that the introduction of the 20-ton cars has brought the average capacity of the cars in use to almost 15 tons, claimed that this advance is quite in proportion to the average advance in indus-

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try and asserted that a progressive gradual advance is preferable to the industrial dislocation that follows radical and sudden displacement of industrial instruments. This officer also stated that, while traffic in Germany is carried over longer distances than in many of the countries of Europe, the hauls do not compare with those in the United States, where the large cars are particularly serviceable. The ministry, moreover, is not convinced that the use of larger cars would sensibly lessen operating expenses, being of the opinion that the dead weight in one 40-ton car, for example, is not greatly less than that in two 20-ton cars.

But notwithstanding these objections, as the manufacturing plants increase in size and number the demand for larger cars must necessarily be more urgent, and the government in the end will undoubtedly be obliged to reëquip and to rebuild the railroads that they may be equal to the demands of traffic conducted on a larger scale. It is significant that two or three of the great manufacturing plants, such as Thyssen in northwestern Germany, have their own interior railroads for their exclusive use, connecting their mines and mills and the entire plant with the contiguous waterway, and that over these private railways are run powerful locomotives and freight cars with a capacity of 40 to 50 tons. In other words, a few of the manufacturing establishments have found it economical to adopt the American practice on their private lines. At pres-

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ent, however, with but few exceptions, the mills and factories do not consume raw material in such vast quantities or turn out finished products in such great volume as do those of America. Not only are the plants smaller, but they are not keyed up to so swift a pace.

Economy of large cars

The great size of many of the modern mills and warehouses in the United States has directly been made possible by the large freight cars, not only because they carry a greater weight, but because they may be loaded to a greater height. This means that in a mill or a warehouse the floor space formerly occupied by a load intended for a 20-ton car can now be utilized for the load intended for a 40-ton car; so also with the load received. This doubled capacity of the floor space permits operations of a larger scale upon the same ground area and per unit of expenditure in various directions. Even were it entirely correct that the dead weight in one 40-ton car is not much less than that in two 20-ton cars, the use of the 40-ton car would be preferable for this reason alone. From the standpoint of the railroad, the use of the 40-ton car is more economical, because the tractive power of a locomotive is more effectively exerted upon the same weight if it be loaded in a smaller number of large than in a greater number of small cars. That is, a locomotive can carry a greater maximum weight in large than it can in small cars.

It is admitted by those whose judgment is be-

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yond dispute that, were German railways equipped with locomotives and cars of the great capacity of those used in the United States, the cost of hauling by rail in Germany could be materially reduced. It is also admitted that such development of the railroads would lead to the location of certain manufacturing plants at places of greater economic advantage, to and from which traffic would move by direct lines, avoiding the shipping, reshipping and transhipping by water. The complaints as to railroad freight rates and railroad facilities in Germany come principally from the great and enterprising manufacturers who want to push ahead on a large scale. The situation is thus in sharp contrast with that existing in the United States, where under private control railroad facilities and railroad rates have been developed to meet the needs of the great industrial and commercial corporations, and where the complaints against the railroads come chiefly from the smaller shippers, the men who have not adjusted their business to the changing economic current and are being worsted in the struggle.

The requirements of the commerce of France are met in most cases by the small cars of 10 or 15 tons, because there is not a great deal of interior traffic, and because the manufactures for export are of high value in proportion to their weight. An exception to the use of small cars is found in the transportation of coal from the northern coal fields of France to the great bed of iron ore that lies

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partly in France, partly in Belgium and partly in Germany, the richest deposits being in Germany. The magnitude of this traffic has induced the railways to install and use freight cars with a capacity of 40 or 50 tons, such as are common in the United States. The increased facilities for supplying coal from these fields of northern France have led certain of the great iron manufacturing companies in Germany to establish plants at the ore fields, whence their products are taken to the markets by rail or, if they are to be exported, to the Rhine for transhipment. Similar economic developments are constantly observable in the United States, where ready and cheap transportation by rail often determines the location of manufacturing establishments.

In Belgium the capacity of the freight cars is from 10 to 15 tons. A few cars of 20 tons have been tried, but these are larger than the customers of the railways desire. Consignees and shippers—the manufacturing establishments included—are not equipped for the reception or the loading of cars of even this capacity.

The freight cars first used on the Russian railways had a capacity of but four tons. Later nine tons became the standard; but in recent years many cars with a capacity of 20 tons have been placed in service. It has been difficult for the railroads, even with the offer of special advantages, to induce shippers to provide loading in the large quantities necessary to make the use of large cars

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profitable; but in recent years the situation has improved.

In other countries where industry and commerce are not in an advanced stage of development, attempts to introduce 20-ton cars have similarly failed. As the manufacturing plants are not adapted to the loading and unloading of cars of greater capacity than 15 tons, it is argued that the introduction of larger cars would necessitate the reconstruction of many of the appliances and structures not only of the railroads, but also of the factories. This of course is true; but the United States passed through similar conditions, and neither the manufacturers nor the railroads hesitated to scrap their old plants and install new ones, with equipments of greater capacity, to meet the demands of an industry and commerce conducted on a larger scale and at a swifter pace than at any other period or in any other land. This high development demands the inflow of vast quantities of raw material and the outflow to all points of the compass of manufactured products in great volume. It is significant that Germany, which of all the countries of continental Europe most nearly approaches the United States in energy and enterprise—and in thoroughness often exceeds it—is the one country where the great manufacturers are chafing because they are held down to the use of the smaller cars.

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CHAPTER VII

INTERNATIONAL RAIL TRAFFIC

As has been stated in an earlier chapter, the improvement of the interior waterways of Europe, the construction of the first canals, the building of the first locks began far back in the Middle Ages. This improvement continued until by the middle of the nineteenth century each of the countries in the temperate zone was well supplied with canals and improved rivers as well as with a good system of landroads. In the fifteenth and following centuries the European nations vied in the discovery, appropriation and exploitation of other lands, whose products were brought to their inhabitants by sea and river. As each nation established colonies in the new lands, its products went primarily to the dominant state. Because of custom and because of governmental policy, there was relatively little commerce between the different nations of Europe. It is, therefore, readily comprehensible that the building of railroads in the different countries of Europe was originally to serve the needs of traffic within each nation. The first railways did not form routes between one state and another, and when

Development of colonial commerce

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such routes were opened, their tariffs were not primarily adjusted to the movement of interstate traffic.

Decline of the canals in the U. S.

In the United States, before the advent of the railroads, the rivers and landways were the means of communication, but the landways were primitive and the rivers were of immediate service to but a scant population. They did not suffice for the needs of the settlers who were penetrating the interior. As in Europe, canals were constructed, and their development continued for a score of years or more after railroad construction had begun. It was early predicted, however, that the railways would supersede the canals, and this prediction was generally realized within 20 or 30 years from the introduction of the first steam locomotives. In many instances canals were abandoned in New York and Pennsylvania, Ohio, Indiana and Kentucky, and the development of the railroads proceeded without check, except that occasionally imposed by their inability to obtain adequate capital. This hindrance diminished as their superiority became manifest. The first short railroads were connected into great through lines, and new railroads were rapidly constructed over thousands of miles in the interior, the west and the south. They were built for the most part in advance of the traffic necessary for their maintenance; their chief economic problem was necessarily the development of traffic; and their rates were adjusted to this end under

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the penalty of bankruptcy. The result has been the present rate adjustments, permitting all except the coarsest and heaviest materials and products from nearly every source of supply to move to practically every market in the entire country. The most important business of the railroads is the transportation of large quantities of goods over great distances, and low through rates have been made to meet the demands of this traffic, with the result that the inhabitants of every region have the choice of a greater variety of commodities than are found in any of the markets of Europe, except in the largest cities. American merchants, even those whose business is on a modest scale, do not think of the dividing lines between the states as affecting their commercial relations any more than the lines of latitude and longitude.

Beginnings of international traffic in Europe

In Europe, on the contrary, states of no greater area are occupied by separate nations, whose expressions of value—the basis of commercial interchange—are in different monetary units; and national rivalry finds expression in customs tariffs. In the course of time, however, the general interest in the exchange of goods began to force these national barriers. As early, perhaps, as 1840 Belgium found that it needed the coal of western Germany, and western Germany that it needed the manufactures of Belgium, and arrangements were made for the conveyance of these commodities across the frontier. Ten or a dozen years later Austria and

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then Russia found that they needed the manufactures of Germany, and Germany that it could use certain of the agrarian products of Russia, and arrangements were made for the conveyance of these commodities across the national boundaries.

In the United States the transfer of commodities between one state and another is effected as soon as means of communication are established. In Europe it is necessary that conventions be entered into between the different countries, specifying the conditions under which roads may be built connecting one country with another and through traffic conducted on such roads, the mode in which the customs duties of each state shall be collected and the circumstances under which these duties may be remitted. Before the establishment of the Kingdom of Italy and of the German Empire such conventions were necessary even between the separate Italian and German states. These political obstacles necessarily retarded the development of international traffic.

There were also physical obstacles. The Alps formed a barrier between northern Europe and Italy, mountainous stretches intervening between the termini of the railroads of the north and of the south that could be crossed only on foot or by animal conveyance. Through rail communication between Vienna and Trieste was made possible by the Semmering tunnel, completed in 1851, and the Brenner tunnel, completed in 1867, opened a

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through line to Venice. The completion of the Mont Cenis tunnel in 1871 and of the St. Gothard tunnel in 1882 permitted the establishment of through service from Paris and Berlin to Rome.

Tourist international travel

A pronounced stimulus to the development of international means of communication was doubtless given by the passenger traffic, in which the continually increasing number of American tourists has been a large factor. Between the larger cities of Germany, Austria, France and Belgium through car service developed early, but not until about 1880 were sleeping cars generally introduced. These now run between the principal centers. The introduction of the sleeping cars was followed, eight or 10 years later, by the establishment of international trains *de luxe,* which run over such routes as from Paris to Constantinople, Ostend to Vienna, Bremen to Genoa, Paris and Berlin to St. Petersburg and Moscow, Paris to Madrid, Calais to Brindisi. Many of these trains run only at certain times of the year, often but two or three times a week. Service of this character is maintained chiefly for the accommodation of tourists, there being comparatively little of that business travel between one metropolis and another which fills, day in and day out, such trains as those which run between New York and Chicago in 18 hours. It is estimated that of the thousands of passengers crossing the English Channel each year, three-fourths are tourists and the greater number of these Ameri-

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cans. So-called through trains run but twice a week over the 1000 miles between Berlin and St. Petersburg.

Special passenger through rates

The through passenger traffic has given rise, as in the United States, to special rate arrangements. Between one and another European city there may be two or more practicable routes of different lengths, and in such cases the longer line accepts the same fare as the shorter, not always making a corresponding reduction to the intermediate points. In some instances the fare to the intermediate point is greater than the through fare. These special rates are most freely given when competing routes lead through different countries. The line, for example, from Ostend through Belgium to the Riviera competes with the routes from the English Channel through France, and the route from St. Petersburg to Rome *via* Berlin competes with that *via* Warsaw. To compete with the sea route *via* Gibraltar, the fare from Marseilles to London by rail and across the English Channel has been made less than the fare by rail from Marseilles to Paris.

The "through trains" do not always run through. Because of the broader gage of the Spanish railways, passengers to and from central Europe are compelled to change cars and freight must be transferred at the frontier. The railroads of Russia also are of a broader gage, and on the Russian frontier it is necessary that passengers change cars and that freight be unloaded and reloaded.

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Through passengers from one nation to another in Europe meet with other hindrances that are unknown in the United States. Baggage regulations vary in the different countries; and at frontier stations stops of an hour or more for the inspection of baggage by customs officers are not unusual. In such instances passengers are sometimes compelled to open their baggage even in the dead of night. Only on the international trains *de luxe* are such annoyances mitigated.

Obstacles to international freight traffic

These impediments in the way of through passenger traffic are inconsiderable in comparison with those which have had to be overcome, and in some cases are not yet overcome in the through movement of freight. Agreements between the various governments concerning the kinds of merchandise that might be conveyed across boundary lines, the rates of transportation, the collection or remission of customs duties were the first steps. Then arose physical and local obstacles. The freight cars were of different patterns, the loading regulations of the various countries were different. Each petty state demanded a separate waybill, and each had its own rules governing the settlement of loss and damage claims, often necessitating tedious and costly litigation for the adjustment of trifling matters. In many cases a shipper could make consignment only to a national boundary, where reconsignment was necessary under different and unfamiliar restrictions, and the location of responsibility for loss or

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injury to a through shipment was often attended by insuperable difficulties.

The Bern convention

These hindrances were so serious that general international negotiations were entered into for their abatement. A conference of representatives of the different governments held at Bern in 1878 initiated a series of arrangements which were completed and formulated in the Bern convention of 1893. This convention specifies the respective rights and liabilities of shipper and carrier in international rail traffic, and the mutual and several responsibilities of railroad companies participating in the carriage of through shipments. It covers in detail the stipulations of the bill of lading for international rail traffic, the procedure in connection with loss and damage claims, the conditions under which articles must be packed before they will be accepted for shipment and the extraordinary precautions that must be taken with high explosives and other extra-hazardous articles. It provides for the establishment of a permanent association to facilitate settlements between the different railways governed by the convention and for the diffusion among them of information pertinent to the matters coming under the cognizance of the association.

The Bern convention is an outgrowth of an agreement inaugurated in 1846, between the states which at present compose the German Empire, together with Austria-Hungary and Holland. This was part of the Zollverein development which had

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previously had a certain effect in breaking down the barriers between the German states and stimulating interstate commerce. To this agreement, which eliminated the cruder and more serious obstacles in the way of through shipments, further provisions were added from time to time, and one country after another became a party to it. It was, however, simply an international agreement; while the provisions of the Bern convention have been incorporated in the legislation of the acceding states.

Customs duties

A most important achievement of the Bern convention was the abolition in the intermediate country of customs duties on traffic passing through that country to another. Under the existing arrangement, for instance, freight from Switzerland destined to Russia passes through Germany in sealed cars, upon the certificate of the railway officers that it is transit freight, without the payment of any German customs duties. Prior to this arrangement—that is, throughout the greater part of the nineteenth century,—freight passing from one country to another was usually unloaded and reloaded at each national frontier. A transit shipment was thus subjected to at least two such transfers, and to the payment of the customs duties in the country or countries of transit as well as in the country of destination. That such a practice severely hampered the development of international rail traffic is evident. An earlier arrangement, facilitating the passage of freight from one country

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to another without stoppage at the boundary, was the assignment of a customs officer to accompany each through shipment. This officer collected the duty *en route* and returned with the empty car from the place of destination. The Bern convention not only obtained the abolition of customs duties in transit countries, but provided for the movement of sealed freight across national boundaries without stoppage or accompaniment by an officer, and for the payment of duties at the place of destination.

The fact that the Bern convention was not initiated until 1878, nor completed until 1893, gives evidence of the slow development in Europe of international rail traffic. The customs arrangements, noted in the preceding paragraph, did not become fairly effective until about 1880. This year may, therefore, be considered as the beginning of any considerable development of through rail traffic between the different countries of Europe. It coincides with the period in which sleeping-cars came generally into use on European trains. It was not until after 1866 that north German interstate traffic became internal traffic of the North German Confederation, and not until after 1870 that the traffic of the south German states became part of the traffic of the empire. In 1880, in the United States, through sleeping-car lines were numerous, and through freight was moving in enormous volume in practically the same traffic channels in which it moves to-day.

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The adoption of the Bern convention furthered transportation arrangements between different countries in matters not covered by its provisions. In 1892 Germany, Austria and Hungary entered into an agreement establishing regulations under which freight cars run over the railroads of these countries and claims for car service and for car repairs are settled. In 1893 similar agreements were concluded by Germany with Luxemburg, Switzerland, Belgium and the Netherlands. In this same year France, which has not become a party to any compact with Germany, established a similar agreement with Belgium, Luxemburg and the Netherlands. The officers charged with the designing and building of freight cars in the different countries are still at work upon the problem of unifying the mechanical apparatus, now of widely varying patterns in the different countries, in order that the cars of the different countries not only may be carried over the same rails, but may safely be combined in the same train.

Although the through freight traffic of Europe has not as yet begun to attain dimensions comparable with those of the through traffic of the United States, it is breaking through the physical and political barriers, and its development is conferring great benefit upon the different countries. The grain and the poultry of Russia are marketed beyond its western boundary; the eggs and dairy produce of Denmark, the fruits of Italy and France and the

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vegetables of Holland find an increasing consumption, and one that is extending through the lower social strata; the clothing and implements of Germany penetrate not only Austria-Hungary, but the center of Russia. Certain cotton goods that pass through preliminary processes in England are forwarded to Bohemia for intermediate manufacture, and are returned to England for the finishing touches. The better grades of French furniture cross the Alps and the delicate wares of Switzerland are more generally diffused. The development of all this traffic has led to a number and variety of special rates and concessions, to further the movement of traffic of one country in competition with that of another, or to enable the products of one land to be sold in the distant markets of another.

Water competition

The international freight traffic of the West-European railways is exposed to a more serious competition by the waterways than is even the through freight traffic of the American railways. As has been pointed out in the second chapter, there are in every European country, except Switzerland, water routes from the interior places of production to one or more ports in the same country, and from these there is of course water conveyance to the ports of the other countries. This water competition has a determining effect upon many of the international rail rates, just as it has upon through rates in the United States. In the first place, it is the desire of each country to pro-

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tect the traffic of its own ports, and low rates are made to and from these ports to secure traffic that otherwise might go through the ports of another country. Thus France protects Havre as against Amsterdam and Rotterdam, and Germany also discriminates against these ports, giving Hamburg and Bremen preferential rates far lower than those applying to the domestic traffic of the Empire. It is a striking example of this national preference that Germany makes through rates *via* Hamburg and Bremen on cotton goods and other products of southern Germany, that normally would go to the Levant over the short routes *via* Vienna, in order that these south German products may move by rail to these north German ports and thence in German vessels by way of Gibraltar to the ports of the Levant. The commercial advantages of Amsterdam and Rotterdam, particularly of the latter, as ports through which are handled products moving to and from the German interior, are maintained by the great natural importance of the Rhine and by the fact that the railways are not allowed to make rates that will enable them effectively to compete for the Rhine traffic. Notwithstanding this governmental partiality, however, they carry a considerable share of it.

It is obvious that merchandise from over sea, destined for the interior of Europe, can be received at ports either of the North Sea, the English Channel, the Bay of Biscay or the Mediterranean, and

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that, as it is received at this port or at that, it may cross one country or another on the way to its destination. This has led to a competitive adjustment of through freight rates, in order that the ports and the railways of each country may receive a share of this through traffic in competition with the ports and the railways of every other country. In this competitive adjustment, rates on international traffic are often made on a scale so low that each of the railways forming part of a through route receives as its proportion of the through rate a far lower return than it obtains on domestic traffic between the same points. For example, on traffic from Italy to western Germany the Swiss railways accept for the carriage between Milan and Basel a much lower proportion of the through rate, which is established in competition with the route through Austria, than they obtain on local traffic from Milan to Basel.

It thus appears that rates on the rail traffic between the different nations of Europe have been determined by influences and considerations entirely analogous to those that have produced the through rates of the United States. In the making of such rates the symmetrical distance bases, which have so often been held up as models for the emulation of the American railways, have proved impossible of application. Moreover, competitive traffic has been pooled since as early as 1848, when a pool was made of the traffic between Cologne and Ham-

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Pooling of competitive traffic

burg and Bremen. Pools now cover various routes of national and international rail traffic. There is the Prussian-Dutch-Belgian pool, the German-Austrian-Italian pool, etc. Through rates and pooling contracts are adjusted by conference between the representatives of the railways of the different nations concerned. A conference of the railways interested in one pool is attended by the representatives of other railways whose traffic may be affected by its action. For example, trans-Atlantic traffic to the interior of Germany *via* Rotterdam, Amsterdam, Bremen or Hamburg competes with such traffic *via* Genoa or *via* Trieste, and representatives of each interest attend the conferences held by the other. The fact that the people of the European countries do not come into so frequent contact with such rate adjustments and pools as do the people of the United States, together with the later development and less comparative importance of the European through traffic, go far to explain the difference between the European and the American attitude towards the apparent anomalies and real discriminations of the rate system. In Europe they have not aroused that bitter complaint and burning contention which have been widespread in the United States, but which could not exist were there popular knowledge and just appraisement of the underlying factors.

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CHAPTER VIII

PHASES OF GOVERNMENTAL CONTROL

(1) GENERAL ADMINISTRATION

In every one of the countries of Europe the government is directly concerned in the administration of the railways, either through immediate ownership and operation, as in Germany, Belgium, Italy and Switzerland; through direct ownership and administration of part of the lines and guaranties to others, as in France, Austria-Hungary and Russia; or through direct ownership and lease to operating companies, as in Holland.

German Empire

The operation of the railroads of the various states of the German Empire is in a measure coördinated through the Federal Council (*Bundesrath*), which consists of delegates appointed by the various state governments. This is the authority which issues regulations regarding the construction and equipment and operation of the railways, in so far as these matters concern the empire as a whole. It has an executive office in Berlin described as the Imperial Railway Office (*Reichs-Eisenbahn-Amt*). This office at first attempted to exercise an energetic

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administrative control, but this attempt failed. The German constitution gives the empire much wider powers than have been exercised, because the development of these powers requires legislation which has not been obtainable.

There is also a "General Conference" of all the railways of the German Empire, which is convened by the Prussian Minister of Public Works, usually once a year. It is assisted by a "Standing Tariff Commission," which is composed of representatives of the different railway administrations and directions, and also of representatives of agriculture, industry and commerce.

Prussia

The official head of the Prussian state railways is the minister of public works, who is appointed directly by the King. In his charge are not only the railways, but also the waterways, which are administered by a subordinate department through an officer reporting to him. The administration of the railways is centralized in the Department of Public Works at Berlin, where five sections are respectively in charge of construction, machinery, traffic, finance and general administration.

The immediate conduct of the Prussian railroads is through divisions entitled "directions," of which there are 21. Each of these is in charge of a president, under whom are direction officers, charged respectively with various phases of the conduct of the direction. Each of these reports to the president of the direction; the president communicates

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important matters to the respective officers at Berlin; and these in turn report to the minister of public works.

Connected with the 21 directions are nine "advisory councils," upon which are representatives of agriculture and commerce; and there is a "general advisory council" for the assistance of the minister, to whom all important questions are referred.

France

In France the management of the railway companies is absolutely controlled by the minister of public works, who is assisted by a "general board of roads and bridges"; a "commission of verification of accounts," composed of councilors of the government and delegates from the ministries of public works and of finance; a "committee of technical exploitation," including representatives of the ministries of war and of the postal service; a "consultative committee of railways," which deliberates on issues of bonds, on complaints regarding the service and on the tariffs submitted for ministerial approval (*homologation*). The number of persons taking part in these deliberations is 150, embracing representatives of the administration; directors of the ministry; councilors of the government; inspectors-general of roads, bridges and mines; delegates from the ministries of commerce, agriculture, finance, post and telegraphs, the colonies, the interior; members representing agriculture, commerce, industry, the Senate, the Chamber of Deputies, the

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chambers of commerce, agricultural societies as well as societies of civil engineers, and the administrators of the different companies that are not owned by the state. To expedite the transaction of urgent business, a permanent section of 68 members is chosen from these 150. This committee embraces representatives of so many and so various interests, all seeking their own benefit, that its positive accomplishment is small. It is able, however, to obstruct many changes that would be beneficial.

A large staff of inspectors, agents and employees follows in all its details the operation of the railways. The minister of public works must approve every proposal for the establishment or construction of a line and may modify it before it is approved; he fixes the number of stations, their locations, their arrangement; he passes upon the erection of storehouses, changes in signals, orders for rolling-stock and rules for employees; and he regulates the number of trains and their schedules.

French bureaucracy

The interference of French bureaucracy in the details of daily life is pushed so far as to make the entire system almost incomprehensible to an American. Our traditions and environment encourage and stimulate that free initiative of the individual, which is primarily directed to his own advancement, but which, in spite of all excesses, leads also, in the long run, not only to the material but to the moral advancement of the community. For the restraint of the excesses and for the correction of the evils

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which are incidental to liberty, it is our wont to look less to governmental action than to public sentiment. The French attitude is very different. The Frenchman looks to *l'État providence* to redress all evils, to make France prosperous and himself comfortable. Instead of entering with zest upon the struggle of life, it is the utmost ambition of thousands of Frenchmen to enter the government employ, to become a *fonctionnaire,* wear a frockcoat upon a starvation salary and look forward to a pittance of a pension. This leads the political party in power to increase the number of government positions that its patronage may be augmented. This was a large factor in the decision of the French government to purchase the Western Railway—whose plant and equipment, it is said, were allowed during the negotiations to fall into a condition of shocking dilapidation. Bureaucratic government and the increasing degree in which socialistic aspirations are being realized, tend to discourage individual effort and to check the development of industry and commerce. They tend to prevent that social progress which they are supposed to further.

Belgium,

In Belgium the prominent and progressive business men have formed themselves into a "superior committee of industry," which is charged with the study of all matters pertaining to the commercial and industrial development of the kingdom. By this committee the conduct of the railroads is declared to be notoriously inefficient. They are ad-

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ministered by government officials, whose positions are permanent and who, therefore, care little whether their operation produces a surplus or a deficit. These men, having no incentive to pursue economies in practice, or in expenditures, are erecting structures not adapted to meet the needs of the future and employing a far greater number of men than is necessary. As the government has come into the ownership of private railways, it is said to have tripled the number of employees. The routine work of the administrative offices is enveloped in red tape. For instance, the dropping of a lighted match on the floor of a storehouse of employees' uniforms started a destructive fire. A board of investigation instituted a series of hearings, of which, at this writing, eleven have been held. Although the cause of the fire and the extent of the damage were readily ascertained, the hearings continue.

Switzerland,

In Switzerland the law provides that the government lines shall be known as the "United Swiss Railways." It was desired that the administrative organization should be made independent of political influence and yet that it should be so closely connected with the government that there would be no danger of its becoming a state within a state, a body that might come into conflict with the government itself. The general control of matters of policy is intrusted to the Federal Council (*Bundesrath*); the direct administration of the railways is

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under the control of a "general direction" and an "administrative council." Under these are the district directors for each of the five districts in which the lines are divided, and under the directors are district railway councils. The administrative council scrutinizes the accounts, examines the annual statements and approves the draft of the railway budget. It has charge of the tariffs and classifications, approves the general plan of train schedules, adjusts the relations with other lines, including those of foreign countries, regulates competitive traffic and renders final decision in regard to construction and additions, whether of plant or equipment. The general direction has charge of the employees and the actual operation, preparing plans and reports for submission to the administrative council.

Austria-Hungary,

The state railways in Austria are under the control of the minister of railways. This office was instituted in 1896; previously, the administration of railways was intrusted to a separate department of the ministry of commerce. The minister is not a permanent official, but a member of the cabinet, and a new minister may come in with every change of government. In Hungary, on the other hand, the head of the state railways is a permanent official responsible to the minister of commerce.

Common to both countries are the regulations governing the transportation of passengers and

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goods and the regulations for the conduct of traffic, both of which correspond to the regulations issued under a similar title in Germany.

The financial control is in the hands of the financial department of each state, but, as far as the railway estimates are concerned, the budget is prepared in conjunction with the railway authorities.

In Austria the direct administration, as distinguished from the general control, is decentralized and conducted by 13 "directions." In Hungary, under the permanent central official, known as the president, are local officials in working control of the nine districts. Matters of general importance are discussed in the single ministry of railways in Austria and public works in Hungary, and in some instances in full cabinet. In Hungary the president of railways brings such matters before the ministry of public works in conference with the minister of finance or a representative of the ministry of finance.

The administrative control of the state over private railways covers construction, maintenance, the type and amount of rolling-stock, passenger and goods tariffs and time-tables. In the case of the guaranteed lines, the state exercises also an extensive financial control.

There are advisory councils, similar to those of Germany, in both Austria and Hungary, but their influence is not important, the final determination of all questions resting with the ministry.

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Italy,

In Italy it was desired that the administration of the railways should be free from political as well as financial influence. They were, therefore, placed under the direction of a "director general," who is appointed by the king upon nomination of the council of ministers. There is a "council of administration" composed of eight members chosen in the same manner. Two are high railway officials, three are high officers of the state and three are citizens of administrative capacity. This council approves proposals for extensions, purchases and contracts; authorizes litigation; directs the disposition of rolling-stock, and track and station adjustments at junction points. It passes upon appointments, promotions, increases of salary, dismissals and retirements. As the minister of public works has the power to veto the resolutions of the council, it is evident that the freedom of the railway administration from political influence is nominal rather than actual.

The director general passes upon proposals and contracts and decides other matters in which the amount involved does not exceed a certain limit. This maximum varies, for different matters, from $1000 to $10,000.

There are two assistant directors general, having prescribed duties. There are 12 central bureaus, each in charge of matters pertaining to a particular line of administration. The immediate operation is conducted through 10 divisions, each in charge of

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a division director; and each director has three assistants, who deal respectively with traffic, operation and maintenance.

(2) EFFECT ON RATES

Germany,

When the railroads of Germany were taken over by Prussia and, to some extent, by the other German states, it was announced that they were to be operated in the economic interest of the nation. Certain it is, however, that the discovery soon made by Bismarck—if indeed it were a discovery, not foreseen by him when he promoted the policy of state control—that the net earnings of the railroads afforded a handsome addition to the state revenue has been utilized throughout the subsequent years in the fiscal interest of the states. It is widely claimed that this policy keeps expenditures low and rates high.

The advisory councils are institutions in which Germany has much pride. Proposals for the modification of railway tariffs are made to these councils and are very thoroughly considered and discussed by them before their recommendations are made. They have no authority, but their conclusions have weight with the railway administration. Their avowed purpose, when counseling a change in a rate, is not to give any shipper or any one district an advantage over another, but to promote the development of national interests. They are, of course, powerless to effect any radical and general

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rate reduction. On the other hand, increases of rates are infrequent; a rate once established being usually permanent. A reduced rate may become effective at once, but two months' published notice must be given of an advance.

It is significant that the government has not developed any such statistical system as that which has been developed by the great railroads of the United States, and which is now regarded by them as an absolute necessity,—a system which enables them to ascertain the efficiency of each division or subdivision of railway line, the comparative cost per unit of maintenance and of operation.

The budget of a German "direction" consists simply of its total revenue and its total expenditure. The absence of information as to the comparative efficiency of different lines and of different directions is part of the policy of the general administration. It does not wish the people of the empire to know how the kilometric system of rates works out in large returns to the railroads of the districts with large traffic and small returns to the railroads of the districts with sparse traffic, it being feared that the people, if they had this information, would demand a reduction of rates in the districts of dense traffic.

France

In France the consultative committee, which passes upon the tariffs submitted for ministerial approval (*homologation*), has existed almost from the first, but until about 1880 it was composed of coun-

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cilors of state who studied the commercial needs of the country and endeavored to adjust the tariffs to its development. Then, however, the chamber of commerce of one city after another sought representation; their success stimulated other demands from other associations; until the committee became the cumbersome and unwieldy body described above, including 150 members. In this body the tendency of the conflicting interests is toward the so-called simplification of tariffs upon the kilometric tapering basis. While applications for slight and unimportant changes often receive prompt attention, deliberations concerning changes of rates proposed to meet particular needs frequently extend over three or four months and sometimes over a year, and the occasion for the making of the new rate sometimes passes before a decision is reached. The railroads no longer have any incentive to adopt experimental rates to develop traffic, for a reduced rate once placed in effect, although it does not have the desired result, can never be advanced again, and a reduced rate in one part of the country serves as an argument for making similar reductions in other parts. That this situation sometimes works to the injury of commerce is admitted by the railway officials. Reduced rates, for example, are not made from the coal fields of France to the lowlands along the English Channel to enable the French coal to compete with the English, as under similar conditions such rates are made in Germany. It is some-

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times contended that if, in years of plentiful vintage, the railroads were allowed to make temporary lower rates, the use of wine could be increased in northern and northwestern France, where cider and beer are the principal beverages. They are, however, not allowed to try the experiment, and in such years the price of wine undergoes a serious decline.

Inelasticity of rates in France

That rigidity of railroad rates is an inevitable result of governmental control has frequently been argued. That the argument has foundation is abundantly proved by the situation in France. There is little attempt, even in the case of international traffic by rail, to make an adjustment of through rates in accordance with commercial needs. One exceptional example of a water-and-rail rate to meet all-water competition is that made on wine from Algiers to Paris, in competition with the all-water route *via* Gibraltar; but this rate was not favorably reported by the consultative committee until the railroad company agreed to reduce its rates on wines from all the stations on its system to Paris.

The attitude of the consultative committee toward propositions for changes in rates, as well as the general tendency to favor the waterways, is shown in a paper by R. Waddington, a senator and president of the Rouen Chamber of Commerce. It should be premised that proposals for changes in rates must always come from the railway companies, although they are often instigated by the shippers who make application to the railways; and

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that in practice the consultative committee allows a difference of 20 per cent in favor of the waterways. In 1904 the railways leading from the ocean to Marseilles were prohibited from reducing their rates on foodstuffs, because the reduction proposed would not allow this customary difference of 20 per cent in favor of the waterways. It was proposed by the railways forming a through route from Spain into France that their rates on fruit be so reduced that they might secure the transportation of some 4000 tons of fruit which were moving by rail from Aragon to Barcelona and thence by sea to Marseilles. The consultative committee, on June 27, 1906, refused to allow the reduction, on the ground that the difference in favor of water transport would be less than 20 per cent. One member said that French shipping should not be hindered in its competition with Spanish vessels. In August, 1903, the consultative committee refused to allow a proposed reduction on chalk on the same ground. It refused, moreover, to allow a reduction on cement that would still have allowed the waterways a difference of 33 per cent, because the railway was evidently trying to attract to its lines traffic which really belonged to the waterways, and such competition was not tolerable.

This policy is further exemplified in the attitude of the government toward the Western Railroad. This line was placed in difficulties by the canalization of the Seine, which diverted from the railroad

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to the river much of the traffic between Havre and Rouen and Paris, and not low-class traffic only. The company naturally desired to make special rates to compete with the waterway, but governmental consent was uniformly refused. The company was told that if it saw fit to reduce its rates over its whole system it might do so, but special competitive rates could not be sanctioned. The company could not afford to make reductions over its lines through the barren and backward districts of Brittany; and the upshot of the matter was that the government, partly because of the embarrassment of the company and partly for political reasons, was obliged to take over the entire Western Railway system.

Under the commercial and industrial conditions of the country this inelasticity of rates does not impede commerce to any such extent as a similar rigidity would impede and even destroy certain traffic in the United States. Men of business admit, however, that to an extent these rates do hinder the growth of traffic. They also state that the governmental control of all the railway operations leads to a general inflexibility against which it is hopeless to contend, that the necessity for referring every proposition to the deliberations of a bureaucratic committee prevents departure from established routine.

Belgium,

In Belgium the superior committee of industry justly declares that the present rates of the Belgian railways are satisfactory, in the main, to the indus-

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trial and commercial interests of the country, but it foresees that the wasteful extravagance of railway operations will, if not checked, result in the course of a few years in a deficit so large as to force an increase in the rates that will be injurious to the business of the country.

Switzerland,

When, in Switzerland, the various railways were taken over by the Confederation their concessions expired, and they were left without authorized tariff schedules. To provide for the promised uniformity of charges, the government, under date of June 27, 1901, published a tariff to apply on all lines of the Swiss United Railways. A draft of this tariff had been sent by the railway council to the Swiss Commerce and Industry Association, the Swiss Trade Association, the Swiss Peasants' Union and the Swiss Railway Union for their comments and recommendations, which these bodies promptly forwarded in detail. Their suggestions, which naturally were largely of various reductions in rates, were complied with as far as possible, the repurchase law having enjoined that in the framing of tariffs the interests of Swiss commerce should receive every consideration.

The government made a similar adjustment of passenger rates, giving general application to the lowest schedule previously in force. It was estimated that these reductions in both passenger and freight rates would bring more than compensation in the increase of traffic. The results for the first

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year or two seemed to accord with this expectation, but during the succeeding period the net revenues have fallen off. This is in accord with the experience of other countries, where experiment has demonstrated that while reductions in rates sometimes lead to a permanent increase in traffic, in other cases they do not.

Russia, The control of the railway tariffs in Russia is vested in several distinct bodies. These are: A "tariff council," presided over by the minister of finance and composed of directors of the ministry of ways of communication and of representatives of agriculture, trade and manufactures and of the private railways; a "tariff committee," composed of members of different ministries, which decides less important questions; and the "department of railway affairs," which works out the detailed adjustment of railway tariffs. The decisions of each body are subject to appeal to the next higher body, those of the minister and the tariff council to the Senate. Under the law which created this administrative organization the compilation of statistics of traffic has been undertaken, and the bi-weekly publication of the "Magazine of Russian Railway Traffic."

The Russian government not only permits but promotes that competition of the railways with the interior waterways which has been a natural development in the United States, but has been forbidden in both Germany and France. During the

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season of navigation the railroads put in operation "navigation tariffs," which are lower than their regular tariffs, in order that they may compete with the rivers and canals. In the adjustment of railroad rates, the Russian government finds itself between the horns of a dilemma. Inasmuch as the earnings of the state railways and the taxation of the private railways are the source of a considerable revenue, which is much needed, there is little or no making of experimental rates for the purpose of developing traffic. Reductions in rates are only made when it is considered certain that an increased traffic will bring a greater net return.

Austria-Hungary,

In Austria and Hungary additional governmental revenue is imperatively required. An increase of the railway rates would appear to offer the most ready relief, but this is inopportune. The Austrian state lines have imposed certain subsidiary charges, and increases are proposed in the stamp duties on waybills. These projects have all been violently opposed by the shippers, but the finance ministry insists that the receipts of the state railways ought at least to cover their expenditures. The conditions in Hungary are similar. The government a few years ago proposed a general raising of the tariffs, but met with such a storm of opposition that the matter had to be deferred. In both Austria and Hungary there is urgent need of extensions and improvements of the railways; and in both countries the political pressure exercised by provincial

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interests is extremely strong, because different nationalities are concerned. A demand which is supported at once by local interest and race feeling is one which a ministry cannot easily refuse. The embarrassments arising from the federation of so many nationalities are illustrated by the fact that any new rule or regulation has to be published in seven different languages.

Italy

In Italy changes in the tariffs are made by royal decree, upon the recommendation of the minister of public works, after they have been considered in the Council of Administration and have received the assent of the ministers of the treasury, agriculture and industry. After a tariff has remained in effect a year, it is presented to Parliament to be enacted into law. Special and temporary reductions in rates are allowed under contract between individual shippers and the director general, with the approval of the minister of public works and the assent of the minister of the treasury.

A "general board of traffic" works out the details of proposed changes in rates and gives advice upon all subjects submitted to it by the minister of public works and by the administration of the railways. This board is composed of three representatives of the state railways, appointed by the railway administration; of functionaries of the various ministries, chosen by the minister of public works; of representatives of the steamship companies, the tramways, the chambers of commerce, the agricul-

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tural societies, the railway employees and the political press; and of eight other members chosen by the minister of public works because of their expert knowledge.

Connected with each of the 10 directions is also a "traffic board," which studies railway matters and makes recommendations concerning the local tariffs, the local time-tables and the needs of the local traffic.

When the state came into control of the railways in 1905 it made great reductions in the passenger fares, introducing the tapering tariff. It also made considerable reduction in the freight rates.

(3) FINANCIAL RESULTS

Germany

That the German government utilizes the net revenue of the railways in its general budget is well known. That is, the income of the railways helps to pay for the support of education and to meet other expenditures for which the state is responsible. In Prussia, one-fifth or more of the needs of the state are supplied by the profits from railway traffic. The minister of public works confers with the finance minister as to all matters of importance affecting either the revenue or the expenditures of the railways. A railway minister once said that it gave him much pleasure to realize that his was the only department of the government in which economies would produce a direct increase of the national rev-

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enue, that the other departments spent money while his made money. The state also receives an income from its lands, forests and mines and from other industrial enterprises in which it is engaged, but this revenue is much smaller than that drawn from the railways. The railway minister goes over the annual budget of the railways with the finance minister and then the finance minister reports the budget to the House of Deputies, which votes the annual appropriation for railway expenditures. Estimated appropriations for maintenance and operation are never curtailed, but it is otherwise with extensions and reconstruction. In 1907 the railways demanded 300,000,000 marks, for new construction, and the deputies voted 250,000,000. Business men claim—but the ministry does not admit—that this submission of propositions for radical improvements to the decision of a political body effectually prevents generous expenditure for the purpose of unusual development or for the making of experiments that seem likely to lead to considerable economies in expediting movement or improving methods. The state railways pay local taxes only, which in 1906 amounted to about $230 a mile.

France

In France, where the government has assumed complete and minute control over the operation of the railways, it paid in the 10 years, 1897-1906, on account of its guaranty of interest, over $27,000,000. From taxes on tickets and baggage, on

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bills of lading, on railway shares, property and licenses and from the customs duties on the coal and other supplies and material used by the railways, the government receives over $30,000,000 a year. It is estimated further that the service which the railways render to the government gratuitously or at reduced rates, in carrying the posts and postal employees, supplies for the telegraph department and telegraph employees; in the transportation of soldiers and sailors, munitions and supplies for the war department and the navy; and in the transportation of agents of the customs, represents a saving to the government of nearly $20,000,000 per annum.

Belgium

In Belgium for many years the governmental operation of the railways showed a deficit, but recently it has produced a surplus which, if distributed throughout the entire period, represents a return of over four per cent on the capital. If the predictions of the Superior Committee of Industry are realized, it will not be many years before there will again be a deficit. Its apprehension is emphasized by the fact that an increase cannot be effected in rates without immediate reaction upon the business of the kingdom. "The geographical position of Belgium as one of the great gates for the whole of the North and Mid-European commerce, supplies a cogent reason for the keeping of rates at the lowest figure, since France and Germany as well as Holland have a keen eye to obtaining as large a share of the

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transit traffic as possible." The railway estate of Belgium is not subject to taxation.

Holland

In Holland each company pays a fixed rental to the state for the state lines which it operates, and its passenger and freight rates must be approved by the minister of railways. When either of the two companies attains a dividend exceeding four per cent, a portion of the surplus is to be paid to the state. Should the dividend fall below three per cent for two years in succession, the company can withdraw from its contract. The state can take over the operation of the lines at any time after giving one year's notice. These companies have paid dividends ranging from four and a half and five per cent respectively, in 1899, to three per cent in 1908, and the rental paid to the government averages about one and one-half per cent upon its investment. With dividends at three per cent, the return upon the total capital averages about 2.4 per cent. Since the operating companies did not provide the capital expended on the real estate and structures, they do not have to provide either for payment of interest in this capital or for the accumulation of a sinking fund.

Switzerland

Under state control in Switzerland, not only have railway rates been radically lowered, but the salaries of the administrative officers have been reduced, with the result that some of the ablest men have left the railroad service. They have been succeeded by men of inadequate experience and ability, and of

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the usual *fonctionnaire* type. The wages of the rank and file of the service have been increased, and the increase in the train service has added greatly to the expenditures. The result of this policy is exhibited in the accounts of the United Swiss Railways for the year 1908, which show an excess of expenditure over income of $1,080,000. The expenses include the interest upon the capital and the amortization, which under the provisions of the repurchase law is to be completed in 60 years.

The general direction of the United Swiss Railways states that this unfavorable showing is largely due to the economic depression. It admits, however, that rates in some cases have been unduly lowered and says that their increase is contemplated. It also admits that the increases in the wages of employees and the extension of the train service have been factors in bringing about the deficit. In 10 years railroads that under corporate operation were fairly profitable have under the control of the state become a drain upon the taxpayers. This has happened in a country where there is little or no contention or jealousy between one section and another, and where, because of their high intelligence and patriotism, the inhabitants have maintained a political organization that has often been cited as a model of government by the people for the people.

Russia

In Russia the government is still obliged to make contributions to the private lines under its guar-

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anty of interest, but the amount decreases almost every year. The government points to this result, and to the fact that some of the commercial lines are beginning to pay dividends, as evidence that there is great opportunity for the profitable investment of capital in the additional railways needed for the development of the great natural resources of the empire.

Austria-Hungary

According to statistics published by the finance departments in Austria and in Hungary, the railways show an annual deficit, but it is claimed that the advantages to the trade of the country from the low price of transportation have been very great. Here the system of taxation is very complicated, averaging perhaps 20 per cent on the net revenue—10 per cent as government income and 10 per cent for local taxes.

Italy

The result of state control in Italy is clearly shown by the following figures. In 1904-05, the last year of operation by the companies, covering 12,018 kilometers, the total receipts were 357,466,038 francs and the total expenses were 291,887,831 francs, leaving a net revenue of 65,578,207 francs. In 1905-06, the first year of exploitation by the state, covering 11,203 kilometers, the total receipts were 351,993,309 francs; the total expenses 291,702,735 francs; the net revenue, 59,290,574 francs. For the year 1907-08, for 13,353 kilometers, the total receipts had increased to 473,128,768 francs, the total expenses to 429,-

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769,944 francs, leaving a net revenue of 43,358,824 francs. The proportion of operating expenses to receipts increased from 68 per cent in 1903 to 74 per cent in 1908. The cabinet that went out of office toward the close of 1909 owed its defeat partly to the fact that it had proposed a general increase in the tariffs of the railways.

In its scheme of accounts the government does not charge to the railways the cost of the existing plants. Their account is debited, however, with the interest on $106,000,000, the amount in which the government was indebted to the private companies and which was included in the payment made by it at the time of purchase. The state railways of Italy pay taxes the same as other public companies.

It is argued by the supporters of state operation that the companies in the last two years of their existence allowed plants and equipment to deteriorate, ran but few trains and at slow speeds, and gained large profits because of the great volume of business, the whole of which they were not able to handle; that the state has increased the number and speed of trains and radically improved the service to the general satisfaction of the people, and has had to face, simultaneously, the increased cost of materials and supplies that has prevailed in Italy as in other countries. Those opposed to state operation claim that it is bureaucratic and inefficient, that the number of employees has been increased

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far beyond any need, that the purchases of material and the expenditures generally have been beyond reason, and they say that with a vastly increased equipment the net earnings should have increased instead of diminishing.

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CHAPTER IX

THE COMPARATIVE USEFULNESS OF INLAND WATERWAYS AND RAILWAYS

In Germany at the present time there exist side by side these two instrumentalities for freight transportation: a system of waterways, really navigable for about 10,000 kilometers, or about 6200 miles, which of course does not include the sea-frontage; and a system of railways extending over 58,000 kilometers, or about 36,000 miles.

European railway freight

Manufactured products, commodities of all kinds that are high in value and low in weight, are chiefly carried by the railroads. Such commodities are rarely transported by water, except between river ports and seaports. The railroads also carry heavy commodities, even in direct competition with the waterways, not only for short distances, but for considerable distances. For example, between the Westphalian coal mines and Frankfort the Rhine and the railroads are approximately parallel. Of this coal traffic the railroads carried, in 1907, 128,799 tons and the river 450,788 tons. That is, notwithstanding the low-grade character of this freight and the lower rates by river, the rail lines carried over a fifth of it, their competition being effective

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throughout the year. When navigation is interrupted because of ice in winter or low water in summer, the railroads carry the heavy freight that normally goes by water. This happens even in the valley of the Rhine, for that river is often frozen over or obstructed with ice for a few weeks in the winter, and it often becomes too shallow for large boats for a few weeks in the summer.

Subsidiary uses of waterways

A comparison of the waterways and the railways must take into consideration other factors than those which bear directly upon transportation. It must be remembered that a large proportion of the expenditure on the German waterways contributes not only to the facility of transportation, but also to the reclamation of land, to irrigation and to the prevention of inundation. Some of the canals—the Main-Danube Canal, for example, which is of small capacity and has been outstripped by the railroads in the competition for freight—have always shown a deficit and, in the absence of adequate information, it is impossible to apportion this deficit among the different functions which they were expected to discharge. Other canals that in earlier years produced a large profit now make no more than a respectable living. At Berlin they are still quite profitable. This city is situated on the Spree, and around it, from one point on the river to another, have been built canals, in order that freight not destined for or originating in Berlin may pass around instead of through the city.

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Fostering of the waterways

A marked advantage possessed by the waterways in their competition with the railroads is that their rates are subject to no sort of governmental regulation. The watercraft pay small tolls for the use of the artificial waterways—*i.e.* the canals,—but they pay nothing for the use of the natural waterways—*i.e.* the rivers. These watercraft charge what is necessary to secure traffic under commercial conditions, what the traffic will bear and the minimum rate which is necessary to secure traffic in competition with each other.

Goods that are billed from a place of shipment contiguous to a river to a distant place of delivery contiguous to the same river are frequently hauled by rail to the river, unloaded from the train, loaded on river craft, again unloaded from the river craft and loaded on a train for their destination. When the place of shipment and that of delivery are not near a river, it becomes a question as to which is preferable—the triple haul with double transfer or through haul by rail. The policy of the government, however, is to foster the waterways as freight carriers. This is shown by the fact that railroads serving manufacturing cities—such as Chemnitz, which is not located directly on a waterway—are operated to serve simply as means of communication between such cities and the nearest waterways: *i.e.* as branches or feeders of the waterways.

The fact that the watercraft are allowed to charge

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what the traffic will bear while the railroads are held to fixed rates is of course a large factor in accounting for the circuitous routes by water over which traffic is sometimes shipped. To take an example, instanced by Dr. Walter Lotz, Heilbronn in Wurtemberg shipped a considerable quantity of soda to Tetschen in Bohemia. It was sent, first, by the Neckar to Mannheim; there it was loaded on a Rhine boat which took it to Rotterdam; there it was transferred to another vessel which took it to Hamburg; there it was transferred to a boat which took it up the Elbe to Tetschen; and the charge for transportation over this roundabout route was less than the rate by rail over the comparatively short distance from Heilbronn to Tetschen direct. This is an extreme case, which is said to have occurred in 1891, but it illustrates the point.

A consideration of prime importance in the governmental control of the railways has not been without influence in the proposals to extend the canals, that is, the military use. It is claimed that a complete network of waterways would facilitate the movement of troops and provide means for the conveyance of the wounded to hospitals in time of war. Every two years the government asks the owners how many rivercraft they could place at its disposal in case of war. It is obvious, however, that in the mobilization of an army the waterways can never rival the railroads; they cannot take

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troops from so many points nor concentrate them with anything approaching equal rapidity.

The great manufacturers admit that canals could not meet the requirements of the highly developed American plants. It is impossible to conceive of a great American factory—such as those which make textiles and boots and shoes in New England, steel in Pittsburg, furniture in Chicago or flour in Minneapolis—being content to remain idle at times of great demand for their products because of interruption to navigation. Moreover, their costs of manufacture are so closely calculated that they would not be willing to pay low rates over the waterways during the period of navigation and radically higher rates for rail transportation during the remainder of the year.

The truth is that because of the traditional fostering of the waterways, and also because the governments of the German states desire to reap immediately as large a net return as possible from the operation of the railways, the possibility of the development of the railways to a standard of efficiency approaching that of the American lines has received practically no consideration.

Comparison of water- and railways,

In comparing the railways and the waterways it is interesting, in the first place, to note the comparative development of each system in length of lines. In 1875 there were in Germany 10,000 kilometers of navigable waterways and 26,500 kilometers of railways; in 1905, 10,000 kilometers, or

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6200 miles, of navigable waterways, and 54,400 kilometers, or 33,728 miles, of railways. That is, as to length, the length of the railways has doubled in 30 years, while the length of the waterways has remained stationary, that is, the length of available waterways. The aggregate length of the interior waterways is stated in the governmental reports to be about 14,000 kilometers. It is upon the highest official authority, however, that the statement is here made that there are available for navigation only about 10,000 kilometers. New canals have indeed been built from time to time during the past 30 years, but the resulting increase in the total length of the canal system has been neutralized by the practical abandonment of old canals, because their traffic has so dwindled that it is not worth while to maintain them.

In 1882 there were 18,715 canal and river boats as to equipment, with a capacity of 1,700,000 tons; in 1907, 26,235 boats with a capacity of 6,900,000 tons, the increase in capacity being 306 per cent. In 1882 there were in Prussia 90,610 freight cars with a capacity of about 900,000 tons; in 1907, 382,185 with a capacity of about 5,100,000 tons, the increase in capacity being 466 per cent. Larger boats have been built for use on the same waterways, while a vastly greater number of cars have been built for use on double the length of railway.

The total traffic measured by tons carried is as follows:

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as to tonnage

RAIL		1885	1905
Import		8,000,000	27,000,000
Export		13,000,000	33,000,000
Local		87,000,000	254,000,000
Transit		2,000,000	5,000,000
	Total	110,000,000	319,000,000
WATER			
Import		6,500,000	20,000,000
Export		3,500,000	11,000,000
Local		7,000,000	21,000,000
	Total	17,000,000	52,000,000

The total traffic measured by ton-kilometers is as follows:

	1885	1905
RAIL	16,600,000,000	44,000,000,000
WATER	4,800,000,000	15,000,000,000

From the second of these tables, in which the traffic is measured by ton-kilometers, it would seem that in 1905 the waterways carried one-fourth of the freight, while in reality, as is shown by the first table, they carried only about one-seventh of the total mass of freight. The discrepancy is due to the fact that the longer haul of the freight on the waterways, the far more circuitous haul, gives a greater volume of ton-kilometers than the haul by railway, which is usually over a route that is approximately direct. Although the total capacity of the freight cars is somewhat less than that of the watercraft, they carry six times as much freight in the year.

Traffic measured in ton-kilometers per kilometer—that is, the traffic density—is as follows:

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	1885	1905
RAIL	448,000	819,000
WATER	480,000	1,500,000

The greater density by water than by rail is a natural consequence of the great volume of traffic on the rivers that are practically estuaries of the North and Baltic Seas; in 1905 the Rhine carried 43 per cent and the Elbe 24 per cent of the entire inland water traffic. The greater ratio of increase in density shown in water traffic follows from the increased volume of traffic over a length of waterway that has remained constant for 30 years, while in that time the length of the railways has doubled, the scant traffic of the sparsely settled regions bringing down the average density of traffic by rail. It would be interesting to know what is the density of the traffic of the railways in the Rhine region, but this the statistics do not show. It will be perceived that in this comparison no account is taken of the passenger traffic, which moves in great volume upon the railways, but is negligible by water except upon the Rhine, where the greater proportion is tourist travel.

Future of waterways in Germany

The results of investigation that are embodied in this volume, and the official statistics set forth in the immediately preceding paragraphs, demonstrate that, notwithstanding the fact that the waterways are the traditional thoroughfares of Germany and receive from the government a special measure of fostering care; notwithstanding the fact that the

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watercraft are exempt from tolls on the natural waterways, pay even on the canals tolls not nearly sufficient to cover the cost of maintenance and interest on the invested capital, and are allowed to make such charges for transportation as they please; notwithstanding the fact that the Emperor so strongly favors waterways that railway and other officials of Prussia who have publicly opposed a forward canal policy have been made to suffer for their temerity—these inland waterways of Germany are lagging behind in the race with the railways, inferior in their carrying capacity as these railways are to those of the United States. Were this not so, why should the length of the waterways have remained constant for 30 years while the length of the railways has been doubled? Why should not canals have been built instead of railways? That the Rhine and the other rivers which are practically estuaries of the sea, penetrating regions of developed traffic, are and will remain useful instruments of transportation is beyond question. But this is because they are estuaries and because they penetrate such regions, and not because of the intrinsic superiority of waterways for inland traffic.

There are not lacking prominent and progressive business men of Germany who say that the canals have outlived their usefulness. That no such admission is made in the Prussian department of public works is to be expected. These progressive business men say that in the future the empire must rely

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more and more upon its railways, that larger locomotives and larger cars must be introduced, and that electricity must be more extensively employed. One reason for the governmental fostering of the waterways is that the present facilities of the railroads are hard pressed to meet the demands of the present traffic. To adequately increase these facilities would involve a capital expenditure so vast that the government shrinks from the undertaking, relying upon the long-existent waterways to relieve the burden upon the railroads. The situation is obviously different from that in the United States, where the question is, "Shall the people allow the railway corporations to obtain the capital needed for the extension of the railroads, or shall the government use money obtained by taxation in constructing waterways that are demonstrably inferior to the railroads?"

The status of the inland waterways of France is set forth in a pamphlet entitled "The Crisis of Transportation," by Ives Guyot, a prominent French economist, a publicist of the highest standing, who was minister of public works from 1889 to 1892. The immediately following paragraphs are a condensation of M. Guyot's statements:

Government favoring of canals in France

The public authorities bestow all their sympathy upon the waterways. The interior navigation is exempt (1) from all repayment and all amortization of the $320,000,000 spent in the construction and improvement of the interior waterways, (2)

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from the payment of any of the expense of maintenance, (3) from the payment of any expense of management, (4) from all service to the government, such as the transportation gratis or at reduced rates of soldiers and sailors, prisoners or the mails.

Excessive burdens of the railways

Burdens of all these kinds, however, are borne by the railroads. In 1904 the tax on receipts from passengers and baggage amounted to over $12,500,000; that on bills of lading and similar documents to $7,620,000; that on railway shares to over $10,800,000; that on railway property and licenses to nearly $1,000,000; and the customs duties on coal and iron consumed by the railways to $800,000, a total of over $32,720,000.

The saving by the government, because of the service performed gratuitously or at reduced rates by the railways, amounts annually in the case of the post to over $9,600,000; in the case of the telegraphs to over $1,600,000; for the transportation of soldiers and sailors to $7,000,000; for the agents of the customs to $600,000; for war transportation to $320,000, a total of over $19,120,000. The total saving of the government amounts to over $1300 per kilometer, or nearly $2000 per mile; yet the receipts of the railroads for 1907 stand at $8550 per kilometer, or $13,760 per mile. The levy of the government upon the railroads by taxes and services amounts to about $52,000,000 annually. "If a corresponding burden were placed upon the boats, they would all be at the bottom of the canals."

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Limitations of the French waterways

The navigable waterways serve but a limited portion of the area of France. The physical conditions are such that they cannot cross the central districts, extend to Normandy, penetrate Brittany or the Alpine regions. The greater part of the population cannot make use of them.

If the respective tonnages of the waterways and the railways of France be compared in the same manner in which the German tonnages are compared above, it will be found that in 1905 the kilometric tonnage of the railways was 17,676,000,000, and that of the interior waterways 5,085,000,000. That is, if traffic be measured in ton-kilometers the waterways carried 22 per cent and the railways 78 per cent of the total traffic. If allowance be made for the longer distance caused by the circuitous routes of the waterways, it will be found that they carried but 11 per cent and the railways 89 per cent of the total freight. It is with less than one-seventh of the railway lines that the waterways can compete for traffic.

The government waterway plans

M. Guyot points out that the works proposed in the program of 1903 are not progressing in accordance with the estimate, and that the expense is constantly increasing; that on 17 enterprises for the improvement and extension of maritime ports, which were to have been completed in 1906, there was to be paid on January 1, 1908, the sum of 19,000,000 francs, while to the credit of these enterprises there remained but 10,000,000 francs; and

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that on 10 interior waterway enterprises there would be required after January 1, 1908, an expenditure of 64,000,000 francs, while to their credit there remained, again, but 10,000,000 francs. He points out, further, that works designed for the improvement of the port of Havre, the estuary of the Seine and the port of Marseilles, involving an expenditure of 130,000,000 francs, which are useful works, have been delayed because of the interference of useless programs and projects; but that, in spite of this delay, the increase over the estimates in the expenditures already made has completely exhausted the resources of the city of Marseilles, which was pledged to participation in the program. He states that, when the canal from Marseilles to the Rhone was projected, it was claimed that the merchandise which at that time went around by Gibraltar would go directly from Dunkirk to Marseilles by the canal and the river, but that a slight detail had been overlooked, namely, that the Rhone is not navigable. In the debates over this project Admiral Cuverville, a waterway enthusiast, admitted that, since 1879, 50,000,000 francs had been thrown away upon this enterprise without result. M. Gourju rejoined that there had been a result; that the work done had hindered the use of the river for small boats, as the stakes driven in the banks in order to concentrate the current in the deeper channel had made the towing-paths useless. Marseilles, pledged to coöperate in the completion of this project, is pledged

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also to improve its docks, and in consequence of these obligations is financially in a most deplorable condition.

M. Guyot urges that the improvement of the waterways and the ports will serve for imports and not for exports. The imported ton is worth on the average only 174 francs, whereas the exported ton is worth 453 francs. The export traffic, which is of merchandise high in value and low in weight, does not move by the waterways. He points out that in 1906, for every 100 kilograms imported, 275 were exported.

Government expenditure for waterways

The entire situation is reflected in the governmental budget. The budgets for the seven years from 1900 to 1906 showed a deficit balance of $49,000,000; the budget of 1908 a deficit of $18,000,000; and that of 1909 a deficit of over $45,000,000. The government has been obliged to issue bonds to obtain the funds wherewith to pay the interest on its outstanding obligations. How it will obtain the money necessary to defray the expenditure upon the works to the prosecution of which it is pledged is a question to which no answer is at this time forthcoming. As M. Guyot puts it: "Certain ministers and certain members of Parliament are, as regards public works, great idealists. They see canals and rivers, they see fleets of pinnaces and boats arriving from all the four corners of the globe in magnificent ports, their goods crossing France on water roads penetrating the whole of Europe. They

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become enthusiastic over these ideas, taking into account neither geographical conditions nor economic conditions. They cry out in oratorical outbursts that France is lost if their projects are not immediately executed. They stigmatize those who do not give their immediate support. In opening the door to expenditures by the billions, the waterway enthusiasts pretend to be adding to the wealth of the country. But where are we to obtain the funds necessary to carry out their projects?"

The de Freycinet railroad program

That portion of the Freycinet program of 1879 for the extension of the railroads, which was to have been completed in 10 years, although in part abandoned, remains unfinished to-day; and that portion which provided for the improvement of ports and waterways, and was to have been completed in a dozen years, also remains unfinished, the expenditures of the government on March 1, 1909, having exceeded the total estimate by 30 per cent. M. Guyot comments:

"Nevertheless, the program which led to so much disappointment and to such heavy expenditure has not diminished M. de Freycinet's prestige. If a private business man had undertaken an enterprise under such conditions he would have become bankrupt. Statesmen have the privilege of getting taxpayers to fill up the deficits they create, and if they do not fulfil their contracts they are not forced to do so by legal proceedings. M. de Freycinet published his program and bequeathed to his successors

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the difficult task of applying it and the loss of popularity resulting from inability to realize unattainable hopes. To justify M. de Freycinet's program it has been repeated, over and over again, that 'the state should take over the direction of French savings.' Deputies and journalists created and kept up the illusion that the execution of public works necessarily created wealth. Now any enterprise the use of which does not insure, by reason of profits, the power to redeem the capital expended therein spells loss. Any private individual knows that; governments ignore it. Once more we see a justification of Adam Smith's declaration, 'Great nations are never impoverished by private, though they are sometimes by public prodigality and misconduct.'"

As stated in a previous chapter, one-half of the interior waterways of France really available for navigation carry 96 per cent of the interior waterway traffic.

Tonnage, by water and by rail

The total tonnage carried by rail in 1905 was 139,000,000, an increase of 72 per cent since 1880. This contrasts with a tonnage of 34,000,000 on the waterways, an increase of 90 per cent in the same period. The ton-miles on the railways were 10,959,000,000 and the average haul 79 miles. The ton-miles on the waterways were 3,153,000,000, and the average haul 92 miles. Because of the circuitous routes, the average haul by water is 60 per cent greater than by rail.

In 1904 the waterways carried 9,800,000 tons of

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coal, the railways 38,900,000; the waterways 11,800,000 tons of building material, the railways 17,300,000; the waterways 3,800,000 tons of agricultural produce and foodstuffs, the railways 15,900,000.

Belgian water- and railways

In Belgium the railways are not allowed to compete with the waterways. From an officer, than whom none stands higher in the councils of the Superior Committee of Industry, was obtained the frank expression of its opinion that, while the canals serve the present needs for the movement of heavy traffic, it will be folly to expend considerable sums for their extension, as the railroads can be so developed as to perform this service more efficiently. The desire to make Brussels a seaport is a dream; its practical realization would require so vast an expenditure that the government could better afford to transport the freight moving by rail between Brussels and Antwerp free of charge, for the expense of such free rail transportation would probably not equal the interest on the investment required to expand the canal for the accommodation of large ocean-going steamers. The popular desire for the extension of the canals arises from the feeling of this town and of that town that commercial prosperity would surely come to it if it had water transportation or increased water transportation—a feeling that is doubtless in great measure inspired by the fact that the great cities of the world, for the most part, are on great water high-

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ways. This popular desire finds expression in Parliament, since its members are always sensitive to the wishes of their constituents.

Holland

The ascertainable facts and statistics in regard to transportation and traffic in Holland show that neither the national government nor the provincial or local governments receive any return upon the capital expended in the construction and improvement of the rivers and canals; that in the relatively few instances in which tolls are collected for the use of the canals, these tolls are only nominal; and that the expenditure of the various governments for maintenance and operation is for the most part without offset in the way of revenue. The expenditures for the maintenance and operation of the railroads are defrayed by the lessee corporations charged with their administration. These companies have been able to pay dividends to their shareholders as well as a rental to the government that averages one and one-half per cent upon the capital investment, and the government also shares in the dividends when they exceed four per cent. Thus even in Holland, the one country in the world where it might reasonably be expected that the inland waterways would be pecuniarily profitable, not only do they pay no return upon capital, but they do not meet the current expenditure required for their maintenance. In this one country of the world where it might be expected that the management of the railroads could not be other than a losing struggle

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for existence, these railroads not only pay a return upon capital, but dividends to shareholders!

Austria-Hungary

In Austria and Hungary state control has reduced competition between the railways to a minimum. There is, however, a certain competition with the waterways, on which the rates are not subjected to governmental control. In winter, when the waterways are closed to traffic, there is an increase in the rail rates on certain traffic for which in summer the railways compete with the waterways. In Hungary the railways have been so successful in competing with the waterways that the water-carrying interests have petitioned the Hungarian government so to revise the railway tariffs as to render this competition ineffective.

Russia

In Russia, as stated in the previous chapter, the government not only permits, but promotes, competition of the railways with the waterways.

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CHAPTER X

SUMMARY OF THE SITUATION ON THE CONTINENT

THAT like causes produce like effects and unlike causes unlike effects is not only a maxim of the exact sciences, but one that has found abundant demonstration in the development of human institutions. The progress of transportation has followed different lines in Europe and in the United States, because the determinant physical, political and economic conditions have been different. But paths that diverge may in the long course become convergent again: the working of the same economic forces leads in time to the same ends.

Natural and artificial ways

Commerce was first developed by races living along coast lands, because the carrying of heavy burdens for long distances was easier by boat over water than by men or animals through forest and marsh. The building of land roads came with the development of the interior; and then appeared the artificial waterways, usually an outgrowth of ditches for drainage, and in nearly all cases devised to connect one natural waterway with another. The building of a canal as a thoroughly independent channel of communication was an anomaly in continental

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Europe and the exception in England. As transportation over the natural waterways was easier and therefore more economical than over the landways, the land roads did not compete with the waterways but supplemented them, as a means of reaching places not favored with water communication. Such were the avenues of transportation in Europe for centuries. Landways were improved and extended, rivers were regulated and revetted, canals were built with locks and dams. The traffic that slowly developed throughout the centuries followed channels determined in the main by the great rivers, and at the mouths of the rivers arose the seaports through which came and went the commerce of the respective countries.

Early railroad construction

The first railroads were constructed between a large city and suburban towns, or between considerable towns not far distant one from the other. They were regarded as improved highroads, of chief use as more efficient feeders of the waterways. That they might supersede the rivers and canals and become the principal means of interior transportation was beyond conception. Of slow development, again, was the idea that the railroads might become instrumentalities for overland traffic between one nation and another; in many cases the railroads of a country were built out toward the national boundary, and then curved along that boundary within the national area.

During the early and experimental period, the

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railroads of nearly every country were built with private capital. Later, when their mechanical feasibility was demonstrated and it became evident that they were an absolute necessity to any country desiring industrial and commercial progress, the various governments furthered their construction, either directly or through grants, subventions and guaranties to concessionaries. In the impoverished countries of Europe where there was no great accumulation of private capital and where the people as a whole were unaccustomed to individual initiative and individual enterprise, there could have been no considerable extension of railroads without governmental aid and support; in some cases they could not have been started except by governmental intiative. Not only was governmental aid extended in the construction of railways, but when, as happened in every country, the private lines became involved in financial difficulties, the governments came to their rescue. It was perceived that railroads were necessary to national prosperity, and therefore for commercial as well as for military reasons no nation could afford to have the existence of the lines within its borders imperiled.

Beginnings of competition between water- and railways

In every country, as the railroads were extended, their desire to secure traffic led them to adapt their rates to this end. There were fluctuations, variations and discriminations. Public antagonism was excited; and it was intensified by the fact that the railways in many cases were outstripping the wa-

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terways, which had long been regarded as the principal and essential channels of communication. In many instances these complaints were a prime factor in leading the states to take over the railway lines and to conduct their operation; in others they induced the governments to assume a rigid supervision over operation and a direct control over rates. Another principal reason for the taking over of the railways by certain of the states was their usefulness in military operations and the necessity for building and maintaining for strategical purposes lines that could not be expected to yield a commercial profit.

Introduction of state ownership

As the states took over the railways, the governments undertook to reform the tariffs, to replace the existing complexity and confusion by simple and symmetrical rate schemes. The impossibility of conducting the commerce of the nation on such a basis was quickly demonstrated in Germany, in France, in Russia and in Austria-Hungary, where the greater portion of the traffic is now carried upon exceptional rates, the adoption of which has been forced by commercial necessity. In the smaller countries, where the traffic is less varied, the simple underlying rate structures have been more nearly adhered to; but there is no country in which there have not been wide departures from the basic schemes.

When, in the more advanced countries of western Europe where vast sums have been spent upon

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rivers and canals, the competition of the railways seemed to foreshadow the annihilation of the interior water traffic, the governments established such railway rates as were required for the protection of the carriers by water. This is markedly the case in Germany, France and Belgium, notwithstanding the facts that in each of these countries the government sustains a large deficit every year because of its investment in and maintenance of the waterways; that in Germany and in Belgium the government reaps a profit from the railways; and that in France the railways would be profitable were it not for the heavy burdens that the government places upon them. In Russia and in Austria-Hungary the railways are allowed to compete with the waterways, with the result that in Hungary the water-carriers bitterly complain that they are doomed to extinction. Even in Germany, France and Belgium, where they receive the largest degree of protection, the boatmen as a rule make but a bare living.

Results of state control

The financial results of state ownership and governmental administration depend not only upon the degree of industrial and commercial development in each country, but upon the character of the government. The strongly centralized government of Prussia operates the railways with severe economy, in order to obtain the greatest net revenue for utilization in the general budget. In France, Belgium and Italy, where socialistic influences are strong in

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the government, the number of employees of the governmental railways has been increased beyond all reason, to make places for political henchmen, with the result that expenses are going up, revenue is going down and the quality of service, from all accounts, is sadly deteriorating.

In Switzerland, where the government has sought to please all the people by lowering rates, increasing facilities and raising wages, the railways which were doing well under corporate management show a deficit after 10 years of governmental administration. Very different results have been obtained in the Netherlands, a country of about equal area, where the railways, although owned by the state, are leased to and operated by corporations. Although the Dutch railways are obliged at every point to make low rates to compete with the waterways, which naturally in this country are the dominant transportation agencies, yet, under corporate management, they not only provide quick and excellent service, but also produce a profit.

The contrast is certainly striking. In Switzerland, where, if anywhere, it might be supposed that the operation of railways ought to be attended with profit, under state administration they show a loss. In Holland, the one country in the world where it might be expected that railways could not maintain an existence, they pay, under corporate operation, not only a return upon capital, but dividends to shareholders.

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Rigidity of rates in Europe

In no one of the principal countries of Europe are the authorities charged with the immediate operation of the railways permitted to adjust the rates arbitrarily without counsel or control. This function is performed, as a rule, by the railway ministry, but in coöperation with a body variously known as an advisory council, tariff committee or consultative committee. This body recommends; the minister, as a rule, has the power to approve or to reject its recommendations. It is usually composed of representatives of the various ministerial departments, chambers of commerce, commercial, agricultural and industrial organizations, and in Italy it includes representatives of the political journals. The Prussian government stoutly maintains that through its advisory councils the rates of the railways are well adjusted to the needs of commerce; this is as stoutly denied by many prominent shippers, who claim that the rates maintain an inflexibility that impedes traffic. In France the railway rates are admittedly of a rigidity that hinders commercial development. In Austria-Hungary, Switzerland and Italy the governments are confronted with the necessity of increasing the rates; since, under pressure of one kind and another, these have been made so low as to entail losses from railway operation, which at present have to be made good by taxation.

Although the jealousy between the European nations and the trend of import and export traffic

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Influence of international traffic on rates

through the seaports long militated against the exchange of products by overland routes, the possibility of railway connection at national boundaries finally gave play to the economic stimulus, and international rail traffic is increasing in proportion as the hindrances are lessened by international agreements. For this international exchange rates have been made that do not rest upon rate bases established for internal traffic. To promote national prosperity the railroads of each of the countries of continental Europe are not only encouraged but obliged by the governments to make rates to the ports on merchandise designed for export that are far lower than the rates on similar merchandise for domestic consumption. This policy, universal in Europe, is the opposite of that pursued by the Interstate Commerce Commission of the United States, whose tendency has been to keep the rates to the ports on export and domestic traffic at a level.

This development in Europe of international traffic that does not pass through the seaports tends to increase the lead which the railroads have obtained over the interior waterways, for in but few cases do rivers or canals connect one country directly with another. It is significant that the railways are being extended year by year, while the length of the interior waterways available for navigation remains practically the same decade after decade. It is true that large annual expenditures

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are made upon the existing waterways, and that projects for their extension have been discussed in one country after another for many years, but these discussions have had little practical outcome. The growing feeling that the nation should not incur the entire expenditure for the construction and improvement of waterways that serve limited areas found expression in France in 1903, in a law providing that the communities benefited by the construction of new waterways should bear at least half of the total cost. Under this law three canals are now in construction, and in certain cases it has been arranged that tolls may be collected for the repayment of local advances. The Prussian act of April 1, 1905, similarly provided that the expense to be incurred in the construction of certain new waterways should be divided between the state and the provinces and corporations primarily benefited. Work under this act has been deferred pending an amendment of the imperial constitution necessary to permit tolls to be charged on rivers as well as on canals, it being held by many that the government should receive larger returns from its expenditure on waterways. If the policy of charging tolls for the use of the interior waterways should generally be adopted in France and Germany, it follows that either the rates of competing railways must be increased, to maintain the existing differences between their charges and those of the waterway carriers, or else the railways will become

State aid to waterways

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more effective competitors of the interior waterways.

The waterway question in the U. S.

In the United States the feeling that the nation as a whole should not bear the entire expense of inland waterway improvements has found expression in the preliminary report of the National Waterways Commission, in which it is intimated that if the states and communities seeking immediate benefit from such projects as are presented for the authorization of Congress were obliged to consent to participate in the expenditures, many of these projects would never be presented.

In the United States, where for over half a century neither the federal government nor the state governments actively interfered with the adjustment of transportation charges, the demonstration of the superiority of the railways over the waterways as carriers of interior traffic led, in many instances, to the abandonment of canals and the disappearance of steamboats from the rivers. It is evident that similar results would have been reached in the principal countries of continental Europe but for the especial protection and encouragement which the governments have bestowed upon the rivers and canals. In the United States a demand has now appeared that similar protection and encouragement should be given to our interior waterways; that the railroads should not be allowed to reduce their rates in competition with water carriers. At the same time it is urged that the construction and improve-

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ment of inland waterways should continue because their competition tends to lower railroad rates.

Laissez faire in the United States

In the United States the régime of *laissez faire* led to bitter rate wars between the railways, which were being brought to an end through traffic agreements and pooling arrangements. In the countries of continental Europe the governments have fostered such agreements, as the most effective preventive of the evils of unrestrained competition; but in the United States, in compliance with a widespread popular demand, they have been declared unlawful.

Under the régime of laissez faire the rates of the railroads of the United States have attained such adaptability to the needs of commerce that traffic of all kinds moves over short and long distances without let or hindrance. Of these rates as a whole, especially against those applying to the flow of the great staple commodities in the principal traffic channels, the records of the Interstate Commerce Commission show that there has been comparatively little specific complaint, the important cases before that commission having grown out of the rivalry between different communities and different districts.

Although these attempts of the European countries to adjust their rates by simple mathematical formulæ did not prove successful, and the bases established a half century ago have been largely abandoned, the rates of these countries applying to

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internal traffic have never regained that elasticity which promotes to the fullest extent the growth of industry and commerce. Nearly a generation after the failure of Germany to confine its traffic movement to a rigid distance-rate basis, certain of the states of the Union have adopted such bases for their intrastate traffic, and the policy of Congress is to extend the authority of the Interstate Commerce Commission over the rates that apply to interstate traffic. It is admitted that since the enactment of the Hepburn law in 1906 the freight rates of the United States have lost much of their previous elasticity and that the railroads are no longer as ready as formerly to try experimental rates for the purpose of developing commerce. That the law of June, 1910, will lead to an increasing rigidity seems beyond question.

Possible results of too rigid regulation

For several years the policy of both the federal and the state legislatures has been directed toward an increasing control not only over railroad rates, but over railroad administration. If this tendency continues, a point will undoubtedly be reached at which the railroads will be justified in saying to the legislative bodies: "You have taken over our properties in fact and are administering them. If this is to continue, you must take them over legally and reimburse their owners to the full extent of their value." If the railroads of the United States should become the property of the single states or of the nation, and should be operated by the state govern-

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ments or by the federal government under any such political conditions as prevail at the present time, it is safe to predict that the results will be similar to those which governmental operation has produced in Switzerland.

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CHAPTER XI

TRANSPORTATION IN ENGLAND*

Individuality of the English railroad system

BECAUSE of its isolated position, its physical characteristics and its peculiar political and economic development, the transportation status in England, although in certain general features analogous to that of the continent of Europe, is in important respects widely different. These differences and the close relation between many English and American institutions, especially the fact that the common law is basic in both countries, make desirable a separate exposition of the development of England's transportation agencies and of the conditions now attending the movement of traffic in that country.

* The historical portion of this chapter is largely based upon notes taken by the writer with the aid of a stenographer in the British Museum. These were interspersed at the time with his own comments; and in making use of them he finds, with regret, that proper distinction was not always made between verbatim citations and his own matter; and he, therefore, fears that he has not been able to indicate quotation in every case where direct quotation is made. The authority for various statements is indicated by reference to the list of books and periodicals appended to the chapter.

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Area

The area of England and Wales is 58,203 miles, very nearly that of the state of Georgia, and less by some 20,000 square miles than that of the region tributary to the Rhine. Physically, England and Wales consist of seven basins, separated one from another by watersheds of varying elevation, in some places pronounced, in others inconsiderable. Of the 215 rivers that drain these basins and find their way to the coast on one side or another, few come from very far in the interior; only the Thames, the Severn and the Trent flow from the Midlands. Although the rivers generally traverse level plains or broad valleys, but six of them are navigable for more than 50 miles, and only a few form in their lower reaches important estuaries. The first settlements of economic importance were naturally at or near the heads of navigation of such estuaries. Thus London owed its wealth and prosperity to the Thames, Bristol to the Severn and the Avon, and Norwich on the Yare had easy access to the sea. York on the Ouse had direct water communication with the surrounding country for many miles in nearly every direction, and the Exe gave Exeter connection with the English Channel.[6]

The early roads

The earliest landways were the Roman roads. These led in most instances from a port on one side of the country to a port on another side. Thus they extended from Dover through London to Chester, from London to Exeter, from Bath to Lincoln

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and from Manchester to Newcastle, the routes being substantially the same as those followed by the great railway lines of the present day.[13] After the Romans withdrew from the island, these highways seem to have been ill maintained, for all accounts of communication during the medieval period dwell upon the wretchedness of the roads. Much of the interior was forest, bog and fen. While the feudal lords accepted a certain responsibility for the condition of the roads, they did not bestow a great deal of effort upon them. A statute of Henry VIII bound each county to repair the bridges of public utility within its limits, and an act of Philip and Mary provided for the election by the parishes of surveyors to see to the maintenance and repair of the highways leading to market towns.[2] The local parishes, however, seldom had funds at their disposal for such repair; and throughout the Middle Ages goods were chiefly carried by means of packhorses and travelers commonly journeyed on horseback[2] along the bridle-paths, which in many parts of the country were the only roads. Even in the middle of the seventeenth century packhorses, strong enduring animals, the breed of which is now extinct, were employed to carry the produce of the loom, the pottery of Staffordshire and even the coals of Newcastle.[8]

In the Saxon era, each of the counties was very much cut off even from adjoining districts, obtaining food and clothing from its own fields and

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from its own flocks and herds. In addition to the towns that had grown up at the heads of navigation on the various rivers and estuaries, smaller settlements arose in fortified camps or around the country house of some king or earl[3] or in the shadow of a great abbey or monastery, as did Oxford.

Wool and agricultural products produce trade relations with Europe

The beginnings of that industry which ministers to the wants of those beyond the immediate neighborhood are rooted in the fact that the soil and the climate of England are especially adapted to the growing of sheep. At least as early as the thirteenth century wool was exported to Flanders and later to Holland and to Italy.[3] During the reign of Edward III, Flemish weavers came to England and established the looms on which the first English woolen goods were made.[1] The growth of the industry was facilitated by the fact that England was incomparably more peaceful than the countries of continental Europe.

The development of the wool industry and progress in agriculture naturally tended to break down the barriers of local self-sufficiency. Merchandise was increasingly exchanged between one place and another, especially at fairs, which were held annually in different parts of the kingdom and were attended by all classes of the population. The largest fairs were held at places near the water where the goods of other lands were most readily obtainable.[1] Hither came Flemish traders with their linen

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and cloth; Frenchmen and Spaniards with their wine; Venetians with silks, velvets and precious stones; Norwegian sailors with tar and pitch; merchants of the Hanseatic League with furs and amber, iron and copper, flax, fustian, buckram, wax, and spices and ornaments from the East. In return the English farmers sold wool, barley, corn, horses, cattle, lead and tin.[3] The principal mercantile event was the visit of the Venetian fleet to the southern shores. Small, light boats plied back and forth, carrying wool between England and Flanders.[3]

Throughout all this period, which extended well into the eighteenth century, the commerce of England with other countries was conducted mainly by the districts adjacent to the coast or to the estuaries. Domestic commerce was also carried by coastwise vessels between one port and another. In the communication between place and place in the interior, peddlers and packhorses were still the principal factors.[8]

Turnpikes

Gradually there came a certain improvement in the landways. The first real effort dated from the passing of the Turnpike Act in 1633.[7] The first turnpike tollgates were erected in the reign of Charles II,[7] but they did not come into general use until 100 years later.[8] Coaches had been introduced in 1553, but not until 1658 was a stage-coach line established between London and Edinburgh, the journey taking nearly a fortnight.[7] In 1669 the

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stage-coach undertook to perform the journey from Oxford to London between the rising and the setting of the sun.[8]

Industrial progress

The landways, however, did not keep pace with the needs of the growing traffic. The wool industry founded by the Flemish weavers had become well established; a body of Italians skilled in handiwork came to England toward the end of the fifteenth century; and many Protestants driven out of the Spanish Netherlands by the Duke of Alva found refuge here during the reign of Elizabeth. Among these were merchants from Antwerp, who were welcomed and encouraged to continue in their vocation. The revocation of the Edict of Nantes was followed by a very considerable immigration of Huguenot silk and linen workers. There was further progress in agriculture, and increased attention was given to the utilization of ore from the veins of iron, tin and lead. The reckless destruction of the forests which once covered so much of England was followed by a more general use of coal.[1] Although this fuel had been mined in Newcastle during the thirteenth century, it hardly entered the markets until 400 years later, because its conveyance over land was difficult and expensive and the barges could not go up the rivers except for short distances. The same difficulties retarded the development of traffic in iron and other metals and in the products of the growing pottery industry.[3] At the beginning of the sixteenth century the eastern and south-

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ern counties were the most prosperous. Their wealth was based very largely upon agriculture, which was here especially profitable because the level land afforded fewer obstructions to the making and maintenance of roads than the uneven interior.[1] In the reign of Elizabeth, however, was completed the transformation of England from a wool-exporting to a wool-manufacturing country;[3] the manufacturing population spread over the towns and the country; and the north became even more prosperous than the south.[3] The development of both industry and commerce was stimulated by the immigration of artisans and merchants, of which mention has already been made. London took the foremost position as the general mart of Europe, where the new treasures of the two Americas were found side by side with the products of Britain, continental Europe and the Orient.[3]

Improvement of the rivers

Improvement of the rivers was begun in the fifteenth century, when the Thames, the Lee and the Yorkshire Ouse received some attention. In the sixteenth century the Severn, the Stour in Essex, the Humber, the Exe and the Welland were improved; in the seventeenth century the Colne, the Itchen, the Warwick, the Avon, the Medway, the Wye, the Bure, the Yare, the Waveney, the Great Ouse, the Witham, the Aire, the Calder, the Trent and the Fossdyke; in the eighteenth century the Avon, the Dee, the Derwent, the Nene, the Kennet, the Weir, the Mersey, the Irwell and the

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Weaver. The artificially improved channels of rivers are designated as "navigations."

Construction of canals

In the seventeenth century, in order to extend the area available for industry, the fens of Cambridgeshire and Hatfield Chase, almost constantly flooded by the rivers, were drained by specially constructed channels.[1] In imitation of the Dutch practice, the salt marshes of Essex and the lowlands of Norfolk were leveed against the sea.[1] In the next century there was increased use of water as power for factories, for corn mills and cloth mills and in connection with the blast furnaces.[1] This development tended to take the industries of the eastern counties to the shores of the rivers and the streams.[1] About the middle of the eighteenth century the Duke of Bridgewater conceived the idea that coal from his collieries at Worsley could be conveyed more speedily and more economically to Manchester by the aid of a canal. The authority for its construction was granted by act of Parliament; it was built and made a practical thoroughfare by James Brindley, who brought it to completion in 1761.[2] Prior to the opening of the canal, the charge for carriage along the existing waterway was 12 shillings per ton and along the landways 40 shillings. The charge by canal was made six shillings, and the price of coal in Manchester at once fell one-half. The canal was extended to the Mersey, affording connection between Manchester and Liverpool and laying the foundation of the prosperity of this dis-

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trict.[2] Before this canal was built, the woolen and cotton products of Manchester intended for export had been carried on horses' backs to the Severn, down which they were floated to Bristol, then the chief seaport on the western coast.[2] After the opening of the canal the packhorses were taken off and the export trade was centered in Liverpool.[2] Here new harbors and docks were built, and this city outdistanced Bristol.[2] The next canal was the Grand Trunk, connecting Liverpool and Hull, and opening up the salt district of Cheshire and the pottery district of Staffordshire. Of the materials used in the manufacture of pottery, flints had been brought from the southeastern ports to Hull and then up the Trent in boats, while the clay had been brought from Devonshire and Cornwall by water up the Severn and had been carried on the backs of horses from the points where water carriage ceased to the potteries, the manufactured articles being returned for export by the same routes. The cost of carriage had been enormous, and consequently the expansion of the earthenware manufacture had been seriously retarded. The same difficulties had hampered the carriage of salt, of corn, coal, lime and ironstone. The Grand Trunk Canal was connected by the Trent with Nottingham, Newark, Gainsborough and Hull. Its effect was to reduce the cost of carriage of all articles by 75 per cent. The population of the districts served by it was trebled in 25 years, and this larger population was more pros-

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perous than the smaller had been. Other canals were built to connect the Severn and the towns of Wolverhampton and Kidderminster with Liverpool by way of the Grand Trunk Canal; to connect Oxford with London as well as with Birmingham and also London with Birmingham, and to connect the mineral districts of Derbyshire with the Trent.[2]

These canals were all built under the direction of James Brindley, an ignorant laborer who, through self-education and extraordinary aptitude, became a noted engineer.[2] Others were rapidly placed in the way of construction and were usually completed with reasonable expedition. The Leeds and Liverpool Canal connected the Irish Sea at Liverpool with Leeds and with the already populous district of Lancashire. Various coal fields and agricultural districts were connected by canal with adjacent rivers.[4] The Rochdale Canal was built to connect Manchester with the Humber by way of the Aire and Calder Navigation. It has been stated that $150,000,000 were spent on these canals and navigations. Since 1852 the Manchester Ship Canal is the only new canal that has been constructed, although various minor improvements and extensions have been made.

Expenditure upon the rivers, principally along the channels of tidal navigation, continued during later years. The Tyne has been made of a uniform depth of nearly 30 feet from Newcastle to the coast-

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line, permitting great vessels to move between the Tyne ports and the sea, and the Severn has been made navigable up to Stourport.[4]

Although it could be truthfully affirmed that continuous lines of water communication existed between the principal commercial centers of England, these continuous lines were rarely, in the proper sense, through routes, affording passage to the same boats from one end of the voyage to the other. There were great differences in the depth and width of different canals, and great differences in the size of the locks, so that through travel was possible only in boats of the size that could be taken by the smallest lock.[4] Great expense was incurred in keeping the canals that crossed the watersheds supplied with water; for in many cases it was necessary to lift the boats through a series of locks to heights of over 400 feet, up to which water had to be pumped. The barges employed to carry goods often went aground. For many days during the summer the canals were closed because of drought, and in severe winters they were at times frozen over. Notwithstanding all these disadvantages, however, and notwithstanding the great improvement of the landways toward the close of the eighteenth century, the canals afforded means of transportation so vastly superior to the packhorses and the stage-coaches that they led to a great advance in the industry and commerce of the country. Mills and factories were drawn to their

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banks and they facilitated the development of the interior.

From 1791 to 1794 there was a canal-building mania. Over 100 canal acts were passed by Parliament before 1800.[9] The value of canal-company shares rose in some cases to 100 times their nominal or par value, and enormous dividends were often paid. In many cases, however, even at this time, the waterways yielded unsatisfactory results and were allowed to fall into decay.[4]

High tide in canal construction

The canal companies enjoyed a virtual monopoly, and with that singular want of foresight which so often accompanies unrivaled success they abused their power and outraged their customers. They shipped as much or as little as suited them and how and when they pleased. They limited the quantity and they fixed the time of shipments, until the difficulties of transit became public talk and the arrogance of the companies a public grievance. The canal proprietors pushed contempt for the public to the point of danger to themselves.[8] To what extent they were personally responsible and to what extent the victims of circumstances beyond their control, it is now difficult to determine.

The truth is that as the packhorses and wagons of the previous era failed to keep pace with the advance of traffic, so the canals and other waterways rapidly fell behind the demands of the industry and commerce to which in their day they had given an unparalleled impetus.

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Water transportation outgrown by manufactures

Arkwright originated the water-frame in 1769; James Hargreaves the spinning-jenny in 1770; Crompton the mule-jenny in 1779; and in 1785 Arkwright took out a patent for improved carding, drawing and rolling machines.[8] The invention of the spinning-jenny and mule led to the provision of more yarn than all the weavers in the kingdom could consume.[7] The invention of the power loom restored the balance, and thenceforward there was no artificial limit to the use of yarn in weaving. But all the horses in the country, whether they were employed on the roads or in drawing canal boats, could not possibly distribute, with reasonable economy, all the cloth which the manufacturers could produce.[7] That is, production was limited by the lack of adequate means of distribution. Just at this time, in the closing years of the eighteenth century, production was further facilitated by the most momentous event in industrial history, the introduction of steam as a source of power. Among the things which the stationary engine made possible were large factories in the neighborhood of the coal fields,[3] superseding small factories along the streams, and consequently a further and very great advance in the productive capacity of interior and northern England. The application of steam to production was soon followed by its application to locomotion. In the early years of the nineteenth century, those inventors who endeavored to utilize steam as a motive power on ordinary roads seemed

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much more likely to succeed than those who based their efforts on roads with rails. Steam engines and steam coaches were devised that actually ran upon the highways, but the roads were not sufficiently substantial to resist the weight of the heavy vehicles.

The first railway

A wooden railway existed in the neighborhood of Newcastle-upon-Tyne prior to 1676,[7] connecting a colliery with the river; and at the beginning of the nineteenth century several such coal railways were in existence, using horses as the motive power. The first line constructed especially for steam locomotion was that covering the 11 miles between Stockton and Darlington in the county of Durham. Its opening on the 27th of September, 1825, attracted slight attention beyond the immediate neighborhood. The London newspapers of the next week published short accounts, but these excited little comment. "The greatest event in the history of the world since the battle of Waterloo was suffered to pass almost unnoticed." [6]

At this time nearly 3000 stage-coaches were in operation in England, about one-half running in and out of London, and 100 mail-coaches. In the next dozen years this number was very largely diminished.[7]

Cost of railways and canals

An article in the *Quarterly Review*,[14] published soon after the opening of the Stockton and Darlington Railway, stated that, while the 75 canals constructed up to that time had cost on the average

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about $45,000 per mile, the cost of the railway was about $25,000 per mile. The article drew further comparisons: "The disadvantages of the canal are many. The frost at one season of the year entirely puts a stop to all conveyance of goods, and the drought at another renders it necessary to proceed with half-cargo. The speed by which goods can be conveyed on a railway can be so regulated as to be certain and constant, while boats are frequently delayed for hours at the lockages of a canal. Railroads may be made to branch out in every direction to accommodate the traffic in the country, whatever be the nature of the surface, while the possibility of carrying branches from a canal in any direction must depend entirely on the surface and the supply of water. Experiment has shown that at the speed of two miles an hour, under the same moving force on a turnpike road, on a canal and on a railway, the canal has the advantage of the turnpike as 15 to one, of the railroad as two to one; at the speed of 2.82 miles the railroad and the canal will be found to be equal; but at the rate of three miles an hour the railway has obtained the advantage over the canal in the ratio of 22.4 to 19.9; and at nine miles an hour the canal can take only one-eighth of the weight conveyed on a railway with the same power."

The Liverpool and Manchester line

The first extensive railway undertaking was that of a line between Liverpool and Manchester. Traffic between these cities had been exposed to peculiar

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inconveniences and annoyance by the inadequacy of canal transportation and the high-handed methods of the canal proprietors. After the first proposition, the project was temporarily abandoned, partly because of engineering difficulties and partly because the canal proprietors had succeeded in arousing opposition on the part of landowners. The canals at last made a reduction in their charges, but this concession was too late. The merchants of Liverpool and Manchester came to a final determination to build the railway at an estimated expense of $2,000,000. The coach owners were fearful of the prospects which opened before them; and the canal owners strove to unite all the opposing interests and prejudices.[8]

Popular objections to the railroads

"They brought every influence to bear to thwart the plans. Every report which could promote a prejudice, every rumor which could affect a principle was spread. The country gentleman was told that the smoke would kill the birds as they passed over the locomotives. The public was informed that the weight of the engine would prevent its moving, and the manufacturer was told that the sparks from its chimney would burn his goods. The passenger was frightened by the assertion that life and limb would be endangered. Elderly gentlemen were tortured with the notion that they would be run over. Ladies were alarmed at the thought that their horses would take fright. Foxes and pheasants were to cease in the neighborhood of a

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railway. The race of horses was to be extinguished. Farmers were possessed with the idea that oats and hay would no more be marketable produce; cattle would start and throw their riders; cows even, it was said, would cease to yield their milk in the neighborhood of one of these infernal machines." [8]

The second attempt to obtain Parliamentary authorization for the Manchester and Liverpool Railway was successful, and the directorate was composed of men of the first importance. While this railway was struggling into existence, many other lines were surveyed, covering nearly all the routes subsequently occupied by the great railways, and in some cases construction was attempted.

Decrease in hostility to the railroad

In 1830, when the construction of the London and Brighton Railway was proposed for the second time, the project was received with a degree of warmth which, considering the hostility previously manifested to the Liverpool and Manchester Railway, was unexpected. Here also, however, there was a certain amount of opposition, voiced by men whose objections were quite as exaggerated and preposterous as those which had been raised against the Manchester line. Moreover, extortionate demands were made upon this railway, as upon the others, and advantage was taken of every trifling want.[8]

A first attempt to start a line from London to Reading was unsuccessful; but a second project, including an extension of the line to Bath and Bristol,

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obtained a charter from Parliament, and in 1841 the railway was opened for traffic. In 1832 a line from London to Southampton was projected, and the act of incorporation received the royal assent in July, 1834. The project for a railway between London and Brighton brought on a fierce fight, during which five separate lines were proposed; and the sums spent by the various companies in endeavoring to obtain Parliamentary authorization aggregated nearly $1,000,000. The London and Essex Railway was proposed first in 1831 and again in 1834; and at about the same time lines were projected to Edinburgh.[8]

Private capital employed

All the English railways were constructed by private enterprise, each under a particular act of Parliament.[9] In 1836-37 railroad speculation developed to the point of mania. There was scarcely a practicable line between two considerable places that was not embraced in the prospectus of one or another company. Promoters resorted to all kinds of tricks to get capital and spent extraordinary sums in the struggle for Parliamentary authorizations. In one case $500,000 were spent without any result; in another, six counsel and 20 solicitors were employed at an expense of $335,000.[8] The promoters of the London and Birmingham Railway spent $360,000, the promoters of the Great Western Railway, $440,000 in carrying their schemes through Parliament.[6] Of the whole capital of the London, Chatham and Dover Railway, which amounted to

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over $80,000,000, not less than $20,000,000 were dissipated in obtaining further subscriptions from the public, and nearly $10,000,000 were disbursed, again out of capital, for the payment of interest and dividends.[9]

In the four years ending with 1829 the railway incorporation acts passed by Parliament authorized the expenditure of only a little more than $4,000,000 a year. In each of the four years ending with 1833 authority was given for an average expenditure of more than $10,000,000. With the outbreak of the railway mania in 1836, schemes for new railways involving an outlay of $225,000,000 were laid before Parliament, and it was suggested that they all be postponed for a year, that an appeal might be made from the country drunk to the country sober. Three different companies promoted competing lines to Brighton; and, although it was obvious that only one of the three bills could be passed, the shares of all the companies were quoted at a premium on the stock exchange.[6] Parliament authorized an expenditure of nearly $55,000,000 a year in each of the four years ending with 1837 and of nearly $105,000,000 in each of the four years ending with 1845.

Progress in railway construction

From 1830 to 1836 about 450 miles of railways were completed, and in the latter year 350 miles were under construction. At this period, the demand for engineers was far in excess of the supply.[8] By 1838 the four great centers of London,

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Birmingham, Liverpool and Manchester were all connected by rail.[11] Less than 2000 miles had been constructed up to 1843, but in 1848 more than 5000 miles had been built. The capital expended amounted to $325,000,000 in 1843 and to more than $1,000,000,000 in 1848. By 1861 the capital embarked in these enterprises amounted to $1,800,000,000, over $80,000,000 a year having been expended during the preceding 18 years.

In 1845 most of the great lines had proved successful. The London and Birmingham was paying a dividend of 10 per cent, the Grand Junction 11 per cent, the Stockton and Darlington 15 per cent, and railway shares on the average were at a premium of 100 per cent.[10]

Opposition from the canals

The canal proprietors, panic-stricken from the inception of the new enterprises, in many cases blocked the railway projects by opposing the bills until the railways had taken over their canals. They argued that, inasmuch as the building of railways would destroy the usefulness of their property, the railways should be compelled to indemnify them by purchase or lease or otherwise. This feeling was generally shared by the public, and in many instances Parliament refused to authorize the construction of a railway except on the condition that it take over the property of a canal. The terms upon which the railways obtained the canals were not easy. The leases to the railways frequently provided that they were to maintain the canals in

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as good condition as when they received them and to guarantee dividends.[4] For example, the London and Northwestern Railway made an arrangement equivalent to a guaranty to the Birmingham and Shropshire Union Canals that amounted to a dividend of about four per cent.

Claims of all sorts against the railroads were exorbitant, and the claimants frequently succeeded in obtaining a good share of what they asked. The prosperity of the new lines of communication appealed to the government as a fertile source of taxation, and the perception produced prompt action. In 1832 a tax was imposed upon railway travel of one halfpenny a mile for four passengers, *i.e.* one-half of a farthing for each passenger. In 1842 this tax was so modified as to amount to about five per cent of the passenger fare, and this is substantially the present levy. The tax rates and government duties imposed on English and Scotch railways in 1857 were equal to about 14 per cent of their net receipts.[12] In 1842 the traffic receipts amounted to less than $20,000,000; in 1861 they amounted to $140,000,000. At each of these periods the working expenses were about one-half of the receipts.[7] The return per mile during the former year was only a fraction less than in the latter, because of the extension of the railroads through sparsely settled territory of scant traffic.[11]

Early passenger traffic

Until the opening of the Liverpool and Manchester line no railway had been constructed for the

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conveyance of passengers. The original intention was to provide for the carriage of goods at a cheaper rate than that charged by canals, and especially to accommodate the traffic of the great coal fields and mineral districts.[15] "The first carrying of passengers was on an aristocratic basis. The railway directors did not conceive that it would pay to carry a large number of passengers at high speed and low fares. Their best trains were therefore reserved for the rich, while the poor were carried at low speed, at inconvenient times and in uncomfortable carriages." [7]

Temporary displacement of laborers

The introduction of machinery and the application of steam to almost every industry dislocated the labor market. There was more or less change of process in almost every sort of manufacturing. Many laborers were thrown out of employment, but wide demand was created for labor adjusted to the new methods. The great industries of the country were in many instances moved to other locations, where they could benefit by the changed conditions;[7] factories of the kind that had previously sought the banks of canals and rivers were now built along the railways. The steam engine, whether working by water or by land, enabled the manufacturer to distribute his goods more efficiently and therefore more widely. The demand for labor in the building of the railroads and then in their operation was a large factor in the readjustment of supply to demand, which gradually reëstablished a

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relation approaching equilibrium.[7] Both directly and indirectly steam locomotion effected a great improvement in the condition of the laboring classes. It came at a time when capital was redundant and the labor market overstocked. It provided a new and almost illimitable field for the investment of the one and for the employment of the other.[7]

The railroads and increased production

Steam locomotion, by water and by land, not only made possible a wider distribution of products, but also necessitated and made practicable the bringing of raw material and supplies of various sorts from greater distances. In the earlier period of England's development the value of the exports probably exceeded that of the imports. In the earlier part of the nineteenth century they were practically of the same value, that of each increasing rapidly year by year, especially after the introduction of the railways.[5] By the middle of the nineteenth century England had become distinctly a manufacturing country, and the one country of the world firmly established in this position. The natural resources of the island had become inadequate to supply raw material for the increasing manufactures, and the farms of England were unable to supply the food required for the continually increasing proportion of the population which was engaged in the manufacturing industries. The necessity for the importation of raw materials and of foodstuffs caused the imports to overbalance the exports of manufactures and of coal. Of the im-

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ports the foodstuffs began to exceed the raw materials of manufacture in the early seventies, and the increase has continued.[5]

The charter maximum rates

As the maximum tolls that could be charged for the use of the canals were from the first specified in the original canal acts, so also were the maximum tolls that could be charged for the use of the railways specified in the original railway acts, it being supposed at the beginning that independent carriers would provide transportation on the railways as they did on the canals. It was soon found, however, that a railway company must itself be the carrier, and not merely the provider of the track and structures, and therefore in the later charters a maximum charge was fixed for the use of the railway and for the transportation combined. The conditions attendant upon the development of commerce after the introduction of railways quickly led to the lowering of nearly all rates below the permitted maximum. To secure traffic between one port and another in competition with coastwise vessels, rates were made lower than between stations not having water communication. For example, to keep traffic from going between Liverpool and London by vessels, the railways put into effect rates that would bring such traffic or a goodly portion of it to their rails, but such reductions were not applied to the intermediate traffic. Because of the long broken coast-line of England and the great number of ports, the competition of water carriage

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is very widely felt; and it has been estimated that about three-fifths of the rail rates have been determined by water competition. Then again, as railways were extended, longer lines began to compete with shorter lines, meeting the short-line rates between competitive stations, but not making the same concessions to intermediate stations. Finally the desire of each railway company to develop the district served by it led to the making of reduced rates to markets reached by other railways from competing districts.

Freight classifications

Classifications of freight were early adopted by the railways; they attained later a certain uniformity through the railway clearing-house; and they have been further unified under Parliamentary direction. At present there are eight classes. Three lettered classes, designated as A, B and C, include heavy commodities, such as coal, stone and pig-iron, in station-to-station service. Five numbered classes, designated as 1, 2, 3, 4 and 5, include merchandise of higher grade, usually shipped in smaller quantities and needing to be loaded and unloaded under cover. Merchandise of relatively lower value, such as raw cotton, is included in class 1, and the more valuable merchandise is graded up, class by class, to class 5, which includes the most expensive goods, such as dress velvets and cigars. With exceptions, the rates on traffic of the numbered classes cover transportation from the warehouse or other place of business of the sender to the storeroom or other

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place designated by the receiver: *i.e.* the railway company performs the cartage to the railway station at the place of consignment and the cartage from the railway station at the place of destination, the compensation for this as well as for the station service being included in the transportation rate. On the lower grades of merchandise, reductions from the ordinary rates per hundredweight are made for shipments of two, four and six tons. Especially reduced rates are now and then made for trainloads.

The seeming anomalies in the long- and short-haul charges and other preferences in the developing rate structure of the English railways early attracted public attention and provoked the same outcry against unjust discrimination that has been raised so persistently in the United States. These and other matters entered into Parliamentary discussion. The course of legal enactment and of governmental procedure in connection with the regulation of the railways has been so admirably summarized by Mr. W. M. Acworth, a distinguished writer on railway economics, in a statement before the committee on interstate commerce of the Senate of the United States, in its hearing on May 9, 1905, that his summary is worth quoting in full:

Acworth on English regulation of railways

"The first important act, I think, that affects the English railways is what is known as the 'cheap-trains act,' which was introduced by Mr. Gladstone as long ago as 1844. One consequence of that act

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was that it regulated what was probably the most important existing rate in the world. I suppose a yearly traffic of $100,000,000 is carried on that rate to-day. The act provided that one train per day should carry third-class passengers at two cents per mile, and the fact is that to-day in England every train carries third-class passengers at that rate.

"This same act of Parliament provided that the state was to be entitled to take over any railway constructed after the passage of the act at 25 years purchase, upon the supposition that the annual profit would be not less than 10 per cent. Practically that act has not been put into force yet.

"With respect to rate regulation proper, the first act that we need to notice was in 1845, called the 'railway clauses consolidation act,' and it applies to every new railway that is constructed. One clause of that act is known as the 'equality clause,' which requires that every railway company shall charge the same rate for traffic carried the same distance under the same conditions. Practically no two kinds of traffic are carried the same distance and under exactly the same conditions. Therefore, a clause that merely insisted on equality when all the circumstances were exactly the same had very little effect.

"Nine years afterwards, in 1854, Parliament enacted what is known as the 'railway and canal traffic act of 1854.' Under that act the railway companies were put under obligations, if the circum-

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stances were different, to make such a difference in the rates as was proportional to the difference of circumstances.

"The early act said circumstances being equal, charges should be equal. The later act said circumstances being different, the difference is to be proportional to the difference of circumstances.

"That act was left to be applied by an ordinary law court, the court of common pleas. That court, being an ordinary law court, showed, I think one may say, a considerable distaste for dealing with what were not strictly law questions.

"It is, of course, familiar to this honorable committee that the question always raised was: What are similar conditions? What are differences of conditions, that justify a difference of rates? At the bottom that is not a legal question, but an economic or business question. From its point of view the court showed considerable distaste, and I think one may say did not encourage complaints of that kind to be brought before it.

"Then after nearly 20 years, in 1872, there was an inquiry into this matter. There was considerable depression of trade following on very great prosperity at the time of the Franco-German War, and the traders grew restive, raised many difficulties and there was an inquiry by a very strong Parliamentary committee consisting of 10 members, nine of whom were at that time, had been, or afterwards became cabinet ministers. That committee recom-

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mended—and it was carried into effect by the act of 1873—the institution of a railway commission. That commission was not a legal court except in the sense that it could make orders, and of its three members two were laymen; there was one legal member, not of the standing of a judge, but the chairman was a layman.

"One effect of that was that the railway companies particularly protested against being subjected to the jurisdiction of what they claimed to be an inferior court. Whenever they were defeated, as they frequently were, they took the case on appeal, or by writ of prohibition, or by various legal methods, before one of the ordinary law courts, and I think one might say that as a rule, certainly in many cases, they succeeded in upsetting the judgment of the commission.

"Another point of very great importance, I think, in the act of 1873, was that it put the obligation upon the railways to publish every rate, perhaps not in the most effective way, but each railroad was compelled to keep, at every station from which it sent traffic, books showing the rates at which all traffic was carried and the conditions attaching to the rate. So that in England if a rate is complained of as giving undue preference, and it is found that somebody is getting a rate which is not published in that rate-book, it is taken by the commission as almost conclusive evidence that there is something unfair about the business, and no rail-

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way company would venture to be found charging a rate not in its rate-book.

"There may be cases where a special rate is justified for a certain period. For example, if an aqueduct is being constructed in a thinly inhabited part of the country, where cement and iron pipes are not easily found and at hand in large quantities, the railroad might give a specially low rate upon cement and iron pipe in large quantities, and then, after that demand for those articles has ceased, wipe out the rate entirely and go back to the prior rate. But in general all rates are published and available alike to everybody.

"Then, there being a great many complaints, not only of the railway situation in general, but of the jurisdiction of the railway commission in particular, there was another inquiry by a committee of the House of Commons, which lasted for many months, extending over two sessions, and going into the whole question of railway rates. The upshot of that was a great deal of difficulty; many bills were introduced in Parliament year after year which did not get through.

"Finally, in 1888, there was passed what is known as the 'railway and canal traffic act of 1888.' That act did, I think, four important things:

"In the first place, it reconstituted the commission, and to get over the former difficulty that the legal member of the commission was not of sufficient status, he was made the president of the com-

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mission and judge of the high court. There is one judge appointed in England, a second in Scotland and a third in Ireland. The other two members of the commission are lay members. If the commission sits in England, the English judge presides; if it sits in Scotland, the Scottish judge presides, and if in Ireland, the Irish judge; and the two other members go to make up the court in whichever country the session is held. It was specially provided that upon questions of law the opinion of the judge should prevail. The judge sits for five years, and then may be either reappointed or his successor may be appointed. When he is not engaged in the commission court—and he is probably not so engaged more than a few weeks in the year—he is doing the ordinary legal work of the country.

"The jurisdiction of that court is, in the first place, interpreting the law as contained in private acts of Parliament, or in what are very frequently termed with us 'agreements,' that are scheduled to private acts of Parliament and of course have the same force as if they were in the body of the acts.

"They also have jurisdiction to sit as arbitrators under certain circumstances.

"I suppose the important matters from the point of view of this committee are questions of undue preference and enforcing reasonable facilities. In England we do not have many of these questions to deal with, because, you may say, the railway law has practically become known to the railway com-

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panies. Within pretty narrow limits the railway companies know how much power they have, what the court has held to be an undue preference, or what it would regard as a refusal of reasonable facilities, and they accommodate themselves to what they believe the court would regard if they were taken into court, and therefore cases do not often come before the court.

"They also have a further power, which I shall mention later.

"A second point, which I think of special interest because it rests on American legislation, is section 31 of the act, which is known as the 'conciliation clause.' The then president of the Board of Trade, our minister concerned with the executive control over railways, had heard of the great success of the Massachusetts Railway Commission, and he endeavored to introduce something on the lines of the Massachusetts commission, but instead of appointing a special body he gave the jurisdiction to the Board of Trade itself. Section 31 provides that the Board of Trade, if anybody complains to them that the railway companies are treating them in an unfair or unreasonable way, may bring together the parties, the railway company and the complainant, and endeavor to settle the difference, and then they shall report at intervals to Parliament the results obtained under that section. They have now reported to Parliament for more than 10 years. They have always said that that section has

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been of great value, and it certainly has been of great value. If I might be allowed to say so, I do not think it has been of as much value as the Massachusetts legislation has been, for two reasons:

"In Massachusetts the sitting of the commission is public and people who are interested (not necessarily parties, but who are concerned in some question) attend the hearings, which are of themselves an education.

"In the second place, the commission gives its reasons at great length, and naturally has to give reasons to justify its action. With us, the official of the Board of Trade who hears the case sits privately. If a big question were to arise, it would probably go forward to the railway commission, who have the power to compel. Naturally the railway companies say, 'If this is going to be taken into court you cannot expect us to show our hand to our opponents in advance, and therefore we will ask you to permit us to waive making our case before you, and reserve it until we get to the law court.' So that it is only the small cases that are dealt with under that section of the act, and, for the reasons given, it certainly has not the same advantage in educating the public and bringing the railway and public nearer together that has been obtained by the procedure in Massachusetts.

"Another point was an enactment that no increase of rates could be made without 14 days' notice. That would no doubt be regarded as a very

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long period in America, where your circumstances are more fluid than ours, but when any railway proposes to make an increase it is bound to give fourteen days' notice before it can advance the rate.

" The act of 1888 provided that the old maximum rates should be entirely repealed and recast. Elaborate machinery was provided, with which I need not trouble the committee. To get at that matter there was held a very long inquiry by two special commissioners appointed by the Board of Trade, who sat, I think, for 180 days, and subsequently by a joint committee of the two Houses of Parliament, which sat, I think, for about 70 days. As the result of that, the whole of the maxima that had been contained in the different railway acts passed in the preceding 50 years were abolished. There were said to be 3000 different acts, each fixing different maxima of rates. They were all abolished, and there was a compendious schedule of maximum rates imposed for each company separately. The large companies had a schedule all to themselves, with a separate act of Parliament permitting it, the smaller companies were grouped, each group supposed to be under similar circumstances, and they had a rate applying to them.

" So that every rate in England is controlled by the fact that it has to be subject to the maxima contained in the act of Parliament affecting the particular railway.

" The last of these acts was passed in the autumn

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of 1892, and the new maxima were to come into force in the beginning of the year 1893.

"That only left the railway companies four or five months in which to recast the whole of the rate schedules from every point to every point in the country. But I believe our schedules are perhaps more complicated than are yours, because I understand that in America the custom is not to make rates between practically every point and every other point, but to make rates only to basing points, and then to leave the local points to be added to that. With us, the country being smaller, and conditions being more stable, it is common to put into the rate-books through rates from the same place upon the same articles to every other place upon the same articles. So that to recast this was exceedingly complicated and difficult.

"When the 1st of January, 1893, came and new maxima came into force, the railway companies had not finished the job, and the result was that in many cases the only instructions given to station agents were to charge the maximum rates. The maximum rates in some cases were nearly double the rates that had been previously charged for what you would call carload lots, and there was a tremendous uproar in the country. Parliament was appealed to, and the president of the Board of Trade stated publicly that he would bring the railway companies to their senses. A new committee of the House of Commons was appointed and heard evidence, and

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they were not apparently satisfied with the statements of the railway companies that they had not intended harm, but had only done what they had done for lack of time, and they made a new limitation of railway powers, that, with regard to any rate that had been increased under this procedure that I have described or that should be increased at any future time, if any member of the public complained he could come before the railway commission, and the railway commission was not to allow the increase to take effect unless the company could satisfy them that there was good reason for allowing it.

"So that you have the railway company subject in these charges to three checks:

"First: The statutory maximum, which of course is not really much of a check; the statutory maximum is not likely to be charged except where there is no competition making a lower rate necessary, or where the traffic is coming in quite small quantities. So that the statutory maximum check is of no value except to local traffic for short distances and small amounts.

"The second check is that the rates must not be such as to constitute an undue preference to one trader or to one district over another. Of course that can only apply as to an individual railway. It cannot apply beyond what the particular railway does.

"Third: The railway company must make no in-

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crease except for good cause, if anybody objects. Of course objection is not likely to come, in practice, except where a considerable number of interests are involved.

"Subject to these restrictions, the railways remain free to make or to vary rates as they please.

"I may perhaps say, sir, that the secret rebate question is non-existent with us. Of course, nobody can prove a negative. I do not think I have ever come across an individual who believed that there were in England any secret rebates that were of any practical importance. They may exist. If they do, probably the officials of the railway companies do not know of them. But for practical purposes the secret-rebate question is of no importance in England. I think there would be a universal agreement as to that.

"We have had in England, as they have had in every other country, heroic proposals. At the time of the uprising of public opinion in 1893, there were proposals to hand over to a county-court judge (who is our judge of first instance in civil matters) the power to say what was a reasonable rate. But these questions have been argued pretty fully more than once before parliamentary committees, and they have never stood the test of argument. The rate-practice history is really the history of what Parliament has enacted in the past with reference to the railway question from time to time

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for just such cure or alleviation of specific ills as were brought to their attention."

It will be perceived from Mr. Acworth's statement that the conclusion reached in England, in regard to the charge of a lower rate for a longer than for a shorter distance over the same line, is practically the same as that arrived at by the Supreme Court of the United States: *i.e.* that dissimilar conditions, which include competition by rail as well as by water, may justify the lower charge for the longer distance.

Pooling

The English railways are free to agree as to rates and to enter into pooling arrangements. Indeed, for many years much of the competitive traffic has been carried under pooling contracts, and the scope of the old pools has been widened within the last two years to embrace a larger part of such traffic.

The English short haul

No place in England is farther than 90 miles from the sea. If a place in the interior be 90 miles from the sea on one side, it is therefore not more than 90 miles from the sea on the other side. All transportation, accordingly, is for relatively short distances, the average haul throughout the kingdom for minerals being probably not more than 30 and for merchandise probably not more than 50 miles. The proximity of nearly every place in England to two or more ports and the desire of the railways serving each port to increase its traffic, have naturally caused rivalry between the different railroads in the interest of the respective ports. A genera-

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tion ago, this rivalry was intense, and it had results which have materially modified the distribution of merchandise in England.

Warehousing

A large incoming vessel naturally brings cargoes of greater quantity than the manufacturers or merchants can conveniently absorb at one time. To accommodate the traders of the interior, the railroad companies have gained control of docks at the ports and have erected warehouses, in which they store for the importers at a nominal charge—in certain places and under certain circumstances without any charge at all—inbound cargoes, from which shipments are made from time to time to the traders in such quantities as they desire. Similar storage is made in other docks and warehouses not controlled by the railways. The result has been that merchants have practically ceased to keep on hand considerable stocks and that manufacturers have largely ceased to receive raw materials in great quantities. This development has been furthered by the increasing use of the telegraph and of the telephone. A merchant in the interior, for example at Birmingham, or Leeds, who, until so recently as a dozen years ago, kept a large or fairly large stock of merchandise at his place of business, now keeps but a small stock, frequently replenishing it by orders and often sending these orders, if haste is necessary, by telegraph or telephone. The goods thus ordered are forwarded by the railway company over night, since the greater number of towns in England may

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be reached from any one of the principal English seaports between the close of business on one day and its opening on the next, or, at the worst, probably within 24 hours. This development has forced the railways to the greatest speed in their deliveries, and has necessitated their continuing to use small cars or "trucks," as they are called, a trainload of which presents an incomprehensible spectacle to the American who sees them for the first time. To his eyes, accustomed to large cars and long trains, the English goods train seems Lilliputian. These trains, however, are adapted to the traffic. Of 4000 or more shipments made from a London freight station in a single night, it was found, by actual count, that less than one-fourth exceeded three hundredweight each.

The English goods train

This change in the distribution of imported merchandise is paralleled by the change in the distribution of products from the English factories. For example, a factory in the interior that once maintained in London a stock of woolen goods of every pattern and size, with a staff of bookkeepers and shipping clerks, now has in London only an agent with an outfit of samples, from which a customer makes selection. The agent at once telegraphs to the factory, and on the following day the goods are at the customer's place of business in any town in England. This method of distribution has become so general that, with the exception perhaps of coal and bricks, large stocks are not kept anywhere in

The short haul and distribution

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England except at the ports where imports are received and at places of manufacture. Even at places of manufacture the stocks of finished goods are often relatively small, the manufacturer keeping his production very close to the level of his orders. He will also manufacture especially even a small order for goods not ordinarily and generally staple.

The grain warehouses of England do not serve as storehouses between one harvest and another, that function being performed by the elevators in the countries of production. Grain for English consumption is ordered from these countries of production all the year round in such quantities as are necessary to keep up the supply in local warehouses.

The railways also maintain in the interior, at their principal stations, warehouses for raw material, from which the manufacturers obtain supplies as they need them. It is thus with wool and cotton, the bases of the great textile industries. Even of the coal consumed in London, about one-half—in 1907, 8,345,094 tons—came by rail and was distributed among the 144 coal depots established by the railways throughout the city, to which the local dealers resort for their supplies. Of the remainder, 8,202,771 tons came by sea, principally from Newcastle, Hull and Goole; and only 24,992 tons by canal.

This retail system of distribution over short distances, the development of which has been unusually

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The short haul and its effect on manufactures

rapid during the last decade, is inevitably affecting the industries. With many a manufacturer who once found it profitable to operate his plant in the vicinity of the interior coal supply, where he worked up raw material from large quantities held in stock, it has now become a question whether it would not profit him to remove his plant to the seashore, thus eliminating the transportation charge on his raw material to the interior. This question especially confronts the manufacturers of heavy goods and of goods which enter largely into the export trade. Some of them have answered it by removing their plants to the coast. Here now are nearly all of the furnaces in which imported ore is wrought into pig-iron; and plants of other kinds are migrating to the water in such numbers as seriously to disturb the interior towns which they are leaving.

In the plants on the coast, moreover, the workingmen and their families are relieved of the rail charge on their foodstuffs, by far the greater proportion of which now comes by sea. The discrimination which the railroads have made in their tariffs in favor of imported foodstuffs and against those of local origin has evoked much complaint from the English farmers. These claim that it is a manifest outrage that grain from other countries, bacon and eggs from Denmark, fruits and vegetables from France and Holland, should be carried by the railways from the ports to the places of consumption at rates far lower than are charged for

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similar foodstuffs of English production. The railways retort that the imported foodstuffs come in large quantities and can be carried in truckloads that run through to the markets, whereas the English farmers and dairymen persist in sending small and scattered shipments. These the railways must pick up at one place after another, seldom obtaining a full truck-load even after stops have been made at several stations. They also state that the imported foodstuffs are carefully and securely packed, whereas the English producers persist in bringing their shipments either without any packing whatever or in insecure bundles loosely put together. They claim that even the offer of lower rates for produce shipped under conditions approximating those under which the imported articles are received has been ineffective to bring about any marked improvement in these heedless practices.

Capitalization

The capitalization of the English railways averages about $314,000 a mile. It includes the initial Parliamentary expenses; the cost of land, which is generally high; the multiple tracks, the great stone bridges and the bridges over or tunnels under road crossings. It has been increased by charging to capital account many improvements which in the United States would have been defrayed out of earnings. It was considerably increased a few years ago by the issue of ordinary or nominal shares. The capital has never been written down because of receiverships and reorganizations.

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Comparison of rates, English and American

The average haul is short; the terminal expenses of course are as great for short-haul as for long-haul traffic; and the cartage of high-class traffic adds to the expense of the service. The charges on the short-distance traffic—that which moves 20 or 25 miles—seem to be less than the charges made for similar distances in the United States, especially if comparison be made with the rates of the American express companies, which do much of the business that corresponds to the short-distance rail traffic of England. In some instances the English rates appear to be lower than the American for somewhat greater distances; but for the real long-distance traffic the rates per ton per mile in England seem to be nearly three times as high as those charged in the United States, where the essential traffic is in great quantities carried for long distances at exceedingly low rates per ton per mile. Even bituminous coal pays a rate of about one cent per ton per mile in the channels of greatest movement, and when comparison is made with higher-class articles, the difference is markedly in favor of the United States. A shipment of malleable iron castings from Springfield, Ohio, to Bradford paid a higher transportation charge from Liverpool to Bradford than from Springfield to Liverpool. A shipment of household furniture which paid but $57.50 for the 815 miles from Indianapolis to New York, paid $35.35 for the 202 miles from Liverpool to London. It has been estimated that in 1900 the

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average receipts per ton per mile of the principal railway in England were: From general merchandise, four cents; from livestock, seven cents; from minerals, one and four-tenths cents. A comparison by the same authority of the traffic of this English railway with the traffic of one of the principal American railways in the year 1900 shows that the average receipt per ton per mile of the American railway was 54 one-hundredths of a cent, while that of the English railway was over two and one-third cents.

It is estimated by Mr. Acworth that the charge for rail transportation in England on the commerce of that country is not more than one-half of the corresponding charge in the United States on the coresponding commerce. It must be borne in mind, however, that a large part of the English consumption is of imported articles, and that on these articles the consumer pays not only the English rail freight, but also the water freight and the rail freight in the country of production. In the United States by far the greater part of the consumption is of articles of domestic origin, and on these articles, which are moved principally by rail, the consumer pays no transportation charge except the rail freight in the United States. It must be remembered, too, that the average haul in the United States is three times as great as in England.

Mileage, and income

The report of the Board of Trade shows that in 1908, in England and Wales, there were 15,861

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miles of steam railways. Their total gross receipts during that year were $499,624,470. The total freight carried amounted to 416,488,885 tons, of which 330,894,917 tons were minerals and 85,543,968 tons general merchandise. Neither ton-mile nor passenger-mile statistics are available. The total capital of these railways was $4,981,220,000, an average of over $314,000 per mile. The return on this capital averages but 3.5 per cent. The return would average about 3.9 per cent if the "nominal" shares issued a few years ago were excluded. The average return to capital per mile is $11,000, an amount greater than the gross earnings per mile of the average American railroad.

Passenger traffic, English and American

A comparison of the passenger traffic of the principal English railway with that of a leading American railway for 1900, made by Mr. George Paish, editor of *The Statist,* shows that the average receipt per passenger per mile on the American line was 1.98 cents and on the English line 1.74 cents. The English railway, with 35 per cent less miles of line, carried 49 per cent more passengers, its density of passenger traffic therefore being 129 per cent greater than that of the American railway. In the average rate per mile are of course included the third-class passengers, who in 1908, on all the railways, constituted 95 per cent of the total number of passengers and paid 74.9 per cent of the total fares, and the season passengers, who paid 10.9 per cent of the total fares.

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In recent years there has been much discussion in England as to the industrial and commercial position of the country. Many think that England's relative position, at least, is not being fully maintained. Mr. Paish puts the situation as follows, in his book "The British Railway Problem," published in 1902:

Paish on industrial position of England

"No one can ignore the fact that the nation has arrived at a crisis in its existence. We have to face the fact that great competitors have arisen, with whom we shall, in the future, have to share trade which until the last few years was ours alone. No one who has watched the growth of the cotton manufacturing industry in the United States, on the Continent, in India and in Japan, can for one moment doubt that we shall never again supply the large proportion of the population of the world with cotton cloth as hitherto, and that we shall have to work hard to retain our fair proportion of the world's cotton trade. Those who mark the development of the iron and steel industries of the United States, of Germany and of Belgium cannot hide from themselves the unpleasant fact that we shall have great difficulties in maintaining our position in the iron trade. Those able to appreciate the wonderful progress of the United States in the production of machinery of all descriptions are certainly justified in their anxiety lest the engineering industry of the country has been eclipsed. The tin-plate trade, of which at one time we had a monopoly,

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has already received a blow from the extension of the industry in the United States. Those in touch with our woolen and worsted trade are certainly uneasy lest France and the United States should take the position we formerly held, if they have not already done so. In the boot and shoe trade we are now apparently outdistanced by the Americans and the French. Our chemical trade has had a most uncomfortable experience in recent years, both from the growth of the industry in the States and in Germany. So far as the production of cereals and of farm produce is concerned, we have long been outdistanced by the enterprise, the scientific methods and the soil of other countries."

This view is not universally accepted. Other authorities, including men of affairs, claim that England's industry and commerce have on the whole increased. They admit that in recent years the percentage of increase is not so large in England as in some other countries, but they point out that these countries practically did not enter the field of industrial and commercial competition until England had substantially attained its full growth.

Economic changes and their effect on English industry

It cannot be doubted that whatever change may have taken place is largely due to economic causes over which England has no control, nor can it be doubted that it is in part due to internal conditions over which England can exert a measure of control. In the middle of the nineteenth century, when the industrial and commercial supremacy of this

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country was unchallenged, England had profited by long years of immunity from war within its immediate borders. During a period in which Europe was torn and weakened with conflict, and the United States had hardly begun to develop its manufactures, the sturdiness and intelligence of England's population and the variety of its natural resources led to the attainment of a high industrial development. Between 1815 and 1870 continental Europe was reorganized on national lines, and the west European nations, although heavily burdened with militarism, have not for nearly 40 years known the ravages of actual war. This has led to a growth of industry, which naturally has entered into competition with that of England. It is needless to recount the progress made in two generations by the United States, which has aggressively entered the markets of the world. This development of the industries of other lands has worked to the disadvantage of English manufacture in more ways than one. Not very long ago English artisans made practically all of the woodwork used in buildings from lumber brought from other lands. Now the contractors find it less expensive to import doors, sashes and blinds, which are made into these finished forms in the countries where the logs are cut. Until very recently a prominent builder kept a force of boys at work making some of the smaller and simpler shapes of wood used in every household. But one day a shipload of these shapes made

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in another land arrived at an English port and were offered to the builder at a lower price, freight included, than they cost when made in his own shops. He bought the cargo and discharged the boys. This is but one example in one line of industry. It could be paralleled in many industries.

Internal conditions in England

It would be ungracious for a citizen of another country, particularly of a country so closely allied as is the United States, to point out the maladjustments in the internal affairs of England, were they not known of all men. The aristocratic and landed interest may not be so much of a burden as in previous generations, but the military establishment weighs more heavily; the short-sighted policy of the trade unions has not only forced up wages, but has diminished the artisan's output; the clinging of business men to old-time methods, comfortable and satisfying as they are to those who can afford to pay good prices for good things, has enabled their more adaptive competitors in other nations to cater more cheaply to the wants of the masses of people in various lands. In the United States the best brains and the greatest energy have gone into the fields of industry and transportation, and the courses of the universities and colleges have been modified in order to qualify graduates for entering upon such careers. In England the tradition that young men attending the universities should receive the education that was originally devised for the clergy has persisted with little modification un-

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til within recent years, and university graduates still flock into public life and into the professions. A counteracting force, which is just beginning to be felt, is the scientific and industrial training given by the universities at Birmingham and at other places.

In the survey of those factors of English life which enter into industry and commerce and which require a better adaptation of means to end, if the material basis of England's high place among the nations is to remain unshaken, there is no need for wonder that its interior transportation agencies have been subjected to critical examination.

The English truck and the retail system of distribution

To the casual observer, familiar with American methods, it would seem that distribution by rail in trucks of eight and ten tons must necessarily be lacking in economy, especially when very many trains are run, each below the drawing power of the engine. It is easy to understand that the small area of the country, its excess of imports and its long coastline should have made it natural for the railways and the merchants to fall into this retail system of distribution, but that it conduces to economy of manufacture would seem open to question. It may be doubted, indeed, whether the system has not been carried too far for the best interests of the country in certain lines of commercial distribution.

These doubts do not rest solely on the impressions of a casual observer: they have been expressed

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by Mr. George Paish, to whom reference has been made, who for many years has given close attention to the minutiæ of railway management both in England and in the United States. In his book, instanced above, he compares the methods of conducting transportation on the American and on the English railways and reaches conclusions distinctly unfavorable to the latter.

English and American methods compared

While making full allowance for the different conditions under which the traffic of the two countries is moved, Mr. Paish argues that the English railway managers have been wasteful in their methods. From such published data as were available he makes the following deductions: The passenger mileage of the foremost railway of England increased 73 per cent from 1880 to 1900, and the increase in train mileage was nearly 60 per cent. Notwithstanding the very great increase in the total passenger traffic, there was an increase of but four passengers per train. The increase in the total ton mileage for the 20 years was 29.8 per cent, while the increase in the freight-train mileage was 24.1 per cent, the average trainload increasing but three tons in the 20 years, while the rate per ton per mile fell off one five-hundredths of a cent. This increase in mileage means that the cost of moving a ton of goods on the principal English railway increased 24 per cent in 20 years, while on a leading American railway it was reduced by 33 per cent. On the American railway the net earnings per ton

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per mile decreased 52.9 per cent, while on the English railway they decreased but 20.9 per cent. Yet the receipts per freight-train mile of the American railway in 1900 were $2.60, while those of the English railway were but $1.62, and this notwithstanding the fact that the average freight rate of the English railway was nearly four and one-half times as high as that of the American. The American railway reduced its cost of carrying a passenger by 13 per cent, while the English railway increased its cost by 11½ per cent. The receipts per passenger-train mile were $1.31, while those of the English railway were $1.08. On the cost of carrying a passenger one mile in 1880 the English railway had an advantage of 42.7 per cent, but in 1900 the difference in its favor was only 26.7 per cent, although the density of its traffic was 128.1 per cent greater.

In the case of the English railway it must be remembered that these figures are not the definite outcome of exact statistics, but deductions from available data, and their correctness has been challenged by English railway authorities. If correct, these deductions clearly justify the criticism of English operating methods as wasteful, especially if it be assumed that no other English railway would be likely to make a better showing than the most important line. The remedy evidently is to increase the load per train, whether of passengers or of freight. In the way of this change are many diffi-

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culties. The railways do not own more than about 55 per cent of the total number of freight cars, and it will not be easy to induce private owners to substitute larger cars of their own, or to use larger cars provided by the company instead of the smaller cars which they control. The use of larger cars will necessitate the enlargement of scales, turn-tables, loading and unloading appliances and other structures that have been built for the smaller cars. It will, however, undoubtedly be to the advantage of the manufacturers and the traders to assist the railways in moving larger trainloads. Larger loads mean economy of operation; economy of operation makes possible a reduction in rates; lower rates will help to diminish the cost of production; and diminished cost of production seems to be the *sine qua non* of English industrial existence.

That accurate statistics of railway operation are necessary for the information of the managers, if these are to guide operation intelligently, and that the English railways have been very deficient in the preparation of statistics, are facts to which attention has been called for many years. It seems, however, that in this respect the railways may be at the beginning of a new era. A very complete report, embodying the forms desirable for the provision of necessary data for future information, has just been made by a committee on statistics composed of representatives of the railways and of the Board of Trade.

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Recent improvements in management

It should also be said that in recent years many of the railways have made vigorous efforts to increase their trainloads and to lower the costs of operation in other ways. As a result, the average receipts per freight-train mile have increased year by year for each of the last 10 years. Many cars of 15 and 20 tons and some of 30 tons have been placed in service. The railway managers say that, except for the carriage of coal, brick, stone and similar material, it is not economical to use a car of more than 15 tons capacity. Large shipments of general merchandise are seldom offered from one place of consignment to one place of destination; and the demand for speedy transportation forbids the holding of cars and trains for full loads of such merchandise. Moreover, as the trains carry many small shipments consigned to a number of different stations, it is more economical to load a truck light for a particular station, that it may be quickly detached from the train at that station, than it would be to put the consignments for two or more stations in the same truck and hold the entire train at the various stations for the unloading of the particular consignments destined to each. It will be perceived that these considerations have their root in the existing system of commercial distribution; and that the traders prefer to pay the present high rates for the quick movement of small shipments rather than lower rates for larger shipments, because the conduct of business with larger stocks of goods

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would necessitate the use of more capital and the increase of their storage facilities. Another difficulty which the railways encounter in the effort to increase their trainloads and decrease their speed is the growing competition of the electric lines and motor-car lines in carrying small freight.

Dissatisfaction with the industrial and commercial situation has led to a revival of interest in the interior waterways. Many persons have expressed a belief that, were the canals and navigations improved, England's handicap in the markets of the world would be diminished.

Royal commission on canals and waterways

In 1906 was appointed a royal commission on canals and waterways, composed of a number of able men, with Lord Shuttleworth as chairman. This commission at once set about a thorough and comprehensive study of the waterways, not only of England and Wales, Scotland and Ireland, but also of continental Europe. Their reports set forth that in England and Wales are 4053 miles of canals and navigations. Of these 965 miles belong to railways, 219 miles are controlled by railways and 2869 miles are independent. The traffic returns show that during 1905 the railway-owned and-controlled canals carried 12,645,030 tons, and the independent canals, exclusive of the Manchester Ship Canal, 19,695,234 tons. The returns further show that between 1898 and 1905 the independent canals gained 500,000 tons and the railway canals lost 2,000,000 tons. The average haul, as far as cal-

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culable, was but 17.5 miles; and upon the waterways for which exact figures were obtainable coal constituted 45 per cent of the tonnage. The gross revenue of the railway canals was $3,217,615, the net revenue $641,525; the gross revenue of the independent canals was $7,934,480, the net revenue $1,682,125. The capital expended on the English canals and navigations is reported to amount to $150,000,000, an average of $37,000 per mile.

Waterway tonnage

Of the 32,340,264 tons carried on the interior waterways of England and Wales during 1905, 21,042,049 tons were carried on 10 waterways, comprising 984 of the total 4054 miles, and the larger part of this tonnage was carried over a relatively small portion of these waterways. About 1,400,000 tons were borne by the Thames Navigation and 1,000,000 tons by the Regents Canal, both of which are engaged in the immediate service of the city of London. Neither of these can be regarded as profitable; for in 1905 the working expenditure of the Thames Navigation exceeded the revenue by over $30,000, while the revenue of the Regents Canal and Dock Company, which has a capital of nearly $9,000,000, exceeded the working expenditure by only $315,000, and of the revenue of this company more than one-third was derived from its docks. The Grand Junction Canal, which has a capital of over $10,000,000, carried 1,800,000 tons, yielding an excess of revenue over working expenditures of about $305,000. The Leeds and

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Liverpool Canal, which has a capital of almost $9,000,000, carried nearly 2,500,000 tons, yielding an excess of revenue over working expenditure of about $190,000. The Aire and Calder Navigation, which has a capital of a little over $15,000,000, carried 2,800,000 tons, which yielded an excess of revenue above working expenditure of over $500,000. The Weaver Navigation, with a capital of over $6,700,000, carried over 1,000,000 tons, yielding an excess of revenue above working expenditure of about $11,000. The Birmingham Canal, to which the London and Northwestern Railway makes an annual appropriation under the terms of its guaranty, carried over 7,500,000 tons. The canals are practically of the same extent as at the beginning of the railway era and, for the most part, are equipped as then with small boats towed by horses. The traffic of many of them has so fallen off that they are cumbered by débris, choked with weeds and in various stages of decay.

Of the most profitable of the navigations is the independent Aire and Calder. Its main line extends about 20 miles from Leeds through very productive coal fields to Goole on the Humber; from that point the Humber is improved to the point at which it becomes an estuary of the North Sea. This navigation carries coal in large quantities to Goole, where it is loaded in vessels that take it to different ports of England as well as to other countries. This coal is loaded at the mines in receptacles termed

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compartments holding about 35 tons each. These are delivered to the mine mouths by trolley, and when they are filled, run down the trolley to the navigation, where they float off into the water. Then they are hauled into line, a number, sometimes as many as 30, forming practically one barge, which is drawn by a tug to Goole, no unloading and reloading being necessary between the mine mouth and that port. In this instance the easy approach from the mine to the navigation, the very gradual slope of the navigation to the not far-distant port, its plentiful supply of water and its few locks render practicable the hauling of large quantities of coal at one time. Even with these great natural advantages in favor of the waterway, the railways carry just about as much coal as the canal from the mines to Goole, and they carry all of the coal from these mines that goes to the farther port of Hull. The navigation and the railway also compete for grain and other commodities that move from the seaport towards Leeds, under a rate adjustment which allows the canal a slight advantage and which is generally supposed to be agreed upon between the railway and the canal.

Manchester Ship Canal

The data given in the preceding paragraphs do not include any facts regarding the Manchester Ship Canal. This was built to enhance the prosperity of Manchester, which her citizens believed to be waning. The capital subscriptions came mainly from them, even humble wage-earners, carried away by

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the furore attending the launching of the project, investing their small savings. This canal has never paid a dividend; but it has brought industries to its banks and business to Manchester and has greatly enhanced the value of land in its vicinity.

Evidence before commission

The witnesses who gave evidence before the commission expressed widely different opinions. The proprietors of and the carriers over the independent canals were practically a unit in favor of their resuscitation. They urged that the railway canals should be taken from under railway ownership and control, which, they claimed, had strangled their traffic. The general proposition seemed to be that the unification of the interior waterway system should be brought about by the government, that it should furnish the requisite capital and perform the necessary work. A few of the witnesses, however, were of the opinion that separate trusts should be formed for the administration of the canals of each district. There was no one to venture the opinion that the required capital could be obtained by private subscription, and but few thought that municipal or other local governments would make any considerable contributions.

The managers of the railways were a unit in saying that the interior waterways could never be made profitable in competition with the railways; that such canals as the railways controlled had not been sought by them, but had been forced upon them by the canal proprietors at the time when the railways

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obtained their charters; that, in accordance with the provisions under which the canals were taken over, they had been maintained in good condition; that the railways had no desire to strangle the traffic of the canals and would be only too glad to see them carry enough traffic to make them remunerative, instead of being compelled to operate them mainly at a loss; that, furthermore, the railways would be very glad to be relieved of the canals and the attendant burdens and would welcome any reasonable proposal looking to that end.

Few of the witnesses were of the opinion that a resuscitated waterway system would be of any particular benefit to agriculture. It was stated that the farmers desired more speedy transportation than the canals could give them; and, moreover, that they would not be able to furnish traffic in sufficient quantities to give the barges adequate loads. It was also generally stated that a waterway system would be of little use in the distribution of the merchandise which is so rapidly conveyed by the railways.

It was generally agreed, even by those who favored the unification of the interior waterways system, that water transportation could not be made profitable except by the use of barges far more capacious than those at present in use, and propelled by steam instead of by horsepower as at present. The barges now in use do not carry, as a rule, more than 25 or 50 tons; and even if one or two water-

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ways where the conditions are exceptional are included, they do not carry more than 100 tons. For the use of barges of greater capacity it would be necessary to increase the depth of most of the canals and of many navigations and to rebuild the locks and other structures. In opposition to this plan, it was pointed out that large barges would not be profitable unless they were fully loaded, and that the waiting for a full load would usually entail a loss of time that would handicap them in competition with the railway. The special proposal that the Grand Junction Canal should be improved in order that it might supply London with a large proportion of its coal was met by showing that the coal would still have to be conveyed by rail from the mine mouths, which are at greatly differing levels, to the canal, and that it would have to be redistributed from the canal to the coal depots in London, whereas the railways now carry coal directly from the mine mouths to the London depots. The inferior capacity of water transportation to develop the ramifications necessary to reach numerous and widely scattered places of shipment and of destination was advanced as one of the principal arguments against extensive improvement of the canals. It was also pointed out that interior navigation would be very slow, even if the boats were propelled by steam, because of the numerous locks, which on many of the canals average more than one to a mile; that the existing difficulty of providing an adequate

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supply of water for the canals that traverse the watersheds would be greatly enhanced were the canals and locks enlarged; and that the impairment of operation due to frost in the winter and drought in the summer would not be overcome.

Those favoring the resuscitation of the waterways admitted that a great number of the canals were not worth improving; that no such traffic could be expected to come to them as would justify the expenditure. Plans were presented for a through system of waterways between London, Birmingham and Liverpool, Bristol, Birmingham and Hull. These plans differed in their provisions as to depth and width of channels and locks and capacity of boats to be used. The estimates have been variously attacked and the conclusions challenged.

Those opposed to the resuscitation of the waterways contend that, if the scheme were practicable, private subscriptions could readily be obtained to any necessary amount; and that it would be unfair to appropriate money taken from the taxpayers of the whole country for a purpose that would benefit only certain parts of the country. It is furthermore contended that it would be a manifest injustice if Parliament, after chartering railways that have been constructed and are maintained by private capital, should invest public funds in competing enterprises; that this policy would be confiscation; and that it would inevitably result in obliging the government to take over the railways.

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The English and American problems not parallel

Whatever be the outcome, it will afford little guidance to those who are concerned with transportation in the United States. In England, as in our country, the railways have demonstrated their superiority over the rivers and canals as instruments for transportation: in England, as in our country, the government has regulated the railways through legislation that has tended to become more stringent in its provisions. Yet the political and economic conditions in general and various elements in particular are so different that the problem of interior transportation in England and that in the United States are practically without parallel.

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